

Johns Hopkins University

**Research into Optimization of Grant Proposal Processing at the Johns Hopkins University
Applied Physics Laboratory**

A Capstone Paper Submitted to the
Krieger School of Arts and Sciences
Advanced Academic Programs

In Partial Fulfillment of the Degree of
Master of Science in Research Administration

by

Melinda P. Locke

Baltimore, Maryland
May 2018

Abstract

The Johns Hopkins University Applied Physics Laboratory (APL) is the nation's largest University Affiliated Research Center. APL has provided critical contributions to critical challenges in support national security needs.

This capstone project focuses on grant proposal development at APL and how grant submissions might be improved. The Business and Communication Services Department (BCSD) plays an important role in grant proposal development and is working to align its strategic priorities to APL's overarching core purpose, core values, goals, and organizational vision. One aspect of this capstone project examined and documented the existing grant proposal process, including work practices, workplace, cross-departmental partnerships and flexible teaming, and infrastructure.

The second aspect of this capstone project obtained survey data from APL staff involved in grant proposal development. The survey was designed as a census survey because the data was an initial exploration of the grants bid and proposals topic at APL. The data types sought through the survey were perceived needs, expressed needs, and relative needs. The survey was aimed at Program Managers, Principal Investigators, Financial Managers, Project Management Assistants, Contract/Grant Managers and Sub-Contract Managers. There were 104 responses from targeted APL employees.

The final aspect of the capstone project involved analysis of organizational design and Information Technology (IT) literature, and relevant APL financial data, and the survey data to identify candidate areas for improvement.

Five recommendations were developed, which were provided to the BCSD 202X activity for consideration and action. The five recommendations target improvements to Research Administration activities executed in support of and in partnership with APL mission areas. The recommendations also either leverage existing IT infrastructure, or propose changes to that platform to transform the existing Research Administration services, achieve the ideals of strategic flexibility, and transform research administration services into a mobile, on-demand shared service set provided in partnership with mission areas.

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Glossary

Detective controls. A class of internal control mechanisms intended to find problems within a company's processes. Detective controls may be employed in accordance with many different goals, such as quality control, fraud prevention, and legal compliance. Detective controls generally look backward at work that is in process or already complete.

Matrix structure. A hybrid of divisional and functional structure typically used in large companies, which allows the benefits of functional and divisional structures to exist in one organization.

Preventative controls. A class of internal control mechanisms designed to keep errors or irregularities from occurring in the first place. Preventative controls are in place ahead of the work or product. Automated preventative controls can forbid certain steps from ever happening in a process. Preventative controls apply rules to conditions that would influence future work.

Service design. The activity of planning and organizing people, infrastructure, communication, and material components of a service to improve its quality and the interaction between a service provider and customers. The purpose of service design methodologies is to design according to the needs of customers or participants so that the service is user-friendly, competitive, and relevant to the customers.

Swim lane diagram. A cross-functional diagram that documents the steps or activities of a process flow or workflow. The term "swim lane" was adopted due to the visual similarity between the horizontal rows of the diagram and the lanes in a swimming pool.

Centralized management structure. A hierarchical decision-making structure where all decisions and processes are handled strictly at the top of the executive level.

Decentralized management structure. A type of organizational structure in which daily operations and decision-making responsibilities are delegated by top management to middle and lower-level managers within the organization, allowing top management to focus more on major decisions.

Strategic flexibility. The capability of an organization to respond to major changes that take place in its external environment by committing the necessary resources.

Abbreviations

AMDS	Air and Missile Defense Sector
AOR	Authorized Organizational Representative
AOS	Asymmetric Operations Sector
APL	Applied Physics Laboratory
B&P	Bids and Proposals
BCSD	Business and Communication Services Department
CM	Contracts Manager
EC	Executive Council
ERP	Enterprise Resource Planning
ERT	Electronic Routing Tool
FM	Financial Manager
FPS	Force Projection Sector
FY	Fiscal Year
G&P	Guidance & Procedures
GM	Grant Managers
GUI	Graphical User Interface
HR	Human Resources
IHE	Institution of Higher Education
IRB	Institutional Review Board
IT	Information Technology
JHU	Johns Hopkins University
MA	Mission Area
ME	Managing Executive—Oversees Science Branches in the Sponsored Sectors
MAE	Mission Area Executive
NSAD	National Security Analysis Department
NSPIRES	National Aeronautical and Space Administration Solicitation and Proposal Integrated Review and Evaluation System

OE	Operations Executive
PI	Principal Investigator
PjM	Project Manager
PM	Program Manager
PMA	Program Management Assistant
RAT	Risk Assessment Tool
REDD	Research and Exploratory Development Department
S2S	System-to-System
SES	Space Exploration Sector
SOW	Statement of Work
SPO	Sponsored Projects Office
SRI	Society of Research Administrators International
SSON	Shared Services and Outsourcing Network
S-CM	Sub-Contracts Manager
UARC	University Affiliated Research Center
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network

Chapter 1. Introduction

For 75 years, the Johns Hopkins University (JHU) Applied Physics Laboratory (APL) has provided “critical contributions to critical challenges with systems engineering and integration, technology research and development and analysis.”¹ Since the mid-1990s, APL has served as the nation’s largest University Affiliated Research Center (UARC). UARCs are independent, nonprofit organizations that conduct vital research, development, and systems engineering to support national security needs. “Throughout its 75 years of service, APL has focused on practical applications of research in a wide range of scientific and technological fields. From what began as a small group of scientists and engineers, APL has evolved into one of the nation’s premier research and development centers, with more than 6,000 employees.”²

1.1. Background

As part of APL’s Centennial Vision, the organization’s Business and Communication Services Department (BCSD) is working to align its strategic priorities to APL’s overarching Core Purpose, Core Values, and “Big, Hairy Audacious, Goals,”³ under an initiative called BCSD 202X. Although not all BCSD 202X strategic components are within the scope of this paper, there are several strategic priorities targeted by this research.

The elements of the BCSD 202X Strategic Plan relevant to this paper are:

- Work Practices: Emphasize continuous improvement and effective use of technology
- Work Place: Become the model of creative and flexible work dynamics
- Partnership: Make customer collaborations and interactions a priority

¹ “About APL,” Johns Hopkins Applied Physics Laboratory, last modified 2018, accessed February 15, 2018, <http://www.jhuapl.edu/>.

² Ibid.

³ Jim Collins and Jerry Porras, *Built to Last: Successful Habits of Visionary Companies* (New York, NY: HarperCollins, 1994).

- Big-picture vision: Determine actions needed to accomplish long-term growth, build or obtain core capabilities, and address structural and cultural changes.⁴

1.2. Statement of the Problem

Before beginning this capstone project, the author engaged in conversations about possible inefficiencies in grant proposal processing at APL. Recognizing the need for change is an easy first step, but making high-value process changes with lasting impact is a challenge. In fiscal year (FY) 2017, in 250 business days, APL submitted 255 grant proposals, with a cumulative proposal value of \$111.5 million.⁵ These proposals were prepared by researchers in APL's Mission Areas. These Mission Areas are staffed by "highly skilled and technically diverse teams of scientists and engineers enabling APL to provide sponsors with innovative solutions to their most complex challenges."⁶ Research administrative support was provided by staff in both the Mission Areas and Enterprise Service Departments.

As the last approver of a proposal before an institutional endorsement is received, this author has an inside view of the current proposal process and understands its strengths and weaknesses. Federal funding for basic research has "flattened over the past decade, thus

⁴ Robin Rude, "BCSD 202X Strategic Planning" (lecture, Johns Hopkins Applied Physics Laboratory, Laurel, MD, June 2017).

⁵ Michael Dolan, "Contract, Grant & IPA Status Report," last modified February 13, 2018, PDF.

⁶ Johns Hopkins University Applied Physics Laboratory, "About APL," Johns Hopkins Applied Physics Laboratory, last modified 2018, accessed April 9, 2018, <http://www.jhuapl.edu/ourwork/default.asp>.

stiffening the competition for federal grants.”⁷ Therefore, it is important to ensure that every proposal application submitted is consistently complete, compliant, and compelling.

Due to factors such as a high grant proposal volume in some of APL’s Business Sectors and low volume in others, there is a disparity in any given proposal team’s knowledge of internal APL Guidance and Procedures (G&P) for grant proposal preparation as well as an understanding of the ensuing proposal processes.

Today, proposal compliance controls, performed by the Grant Managers (GMs), occur near the end of the review cycle. These are positioned as detective controls. As a result, a reviewer’s first opportunity to see and learn about the proposal may be when the Electronic Routing Tool (ERT) sends the notification that the proposal is ready for final review.

Receiving the proposal late in the workflow process delays identification of problems, which may result in proposal compliance issues such as incorrect rates or costing templates, solicitation non-compliance issues such as exceeding yearly cost limitations or missing required documentation. The risk is that there may not be enough time to make changes to a proposal to correct these errors before the submission deadline. Thus, the opportunity to submit may be lost, or a proposal may be submitted with errors and returned from the sponsor without a review.

APL technology platforms on which grant proposals have historically been prepared are scheduled to undergo significant changes in 2018. Major information technology (IT) elements, such as planning workbooks and the official cost estimating system, are to be retired and

⁷ Jeffrey Mervis, "Data Check: U.S. Government Share of Basic Research Funding Falls below 50%," *Science*, last modified March 9, 2017, accessed March 11, 2018, <http://www.sciencemag.org/news/2017/03/data-check-us-government-share-basic-research-funding-falls-below-50>.

replaced in the latter part of this year. These changes have sparked the need for substantial grant proposal workflow redesigns.

1.3. Research Questions

The seven questions that motivated this research are listed below:

- 1) Does the volume of grant proposals produced by a Sector indicate the likelihood of non-compliance issues or errors in a proposal?
- 2) Which Sectors need help with proposal preparation, and why?
- 3) Is more awareness and oversight of internal G&P necessary to improve internal APL proposal compliance?
- 4) Are there any changes to these G&Ps that would simplify the process or make it easier to follow?
- 5) How are the critical proposal preparation processes linked cross-organizationally?
- 6) Is the review process sufficient to ensure that compliant proposals are consistently submitted to sponsors?
- 7) What technological platform advances might facilitate a more effective and efficient proposal preparation and review process?

1.4. Research Objectives

The ensuing research objectives were designed to evaluate organizational structure, existing work processes, end-to-end proposal practices, and policy knowledge, and to design improved engagement methods at APL. The research objectives included:

1. Comparing organizational design at APL to organizational structures found in the literature
2. Examining APL's existing workflows to map the current processes, spot weaknesses, and determine if there are alternative approaches that should be tested and implemented
3. Designing and issuing a web-based Google survey questionnaire to stakeholders to ascertain their degree of involvement in the grant proposal process, gauge familiarity with APL G&Ps related to grant proposal preparation, and solicit suggestions for process improvements
4. Reviewing existing and planned electronic research administration tool capabilities
5. Contributing useful research outcomes to APL's BCSD 202X strategic planning initiative.

1.5. Significance

This research into the current grant proposals process is significant because it provides a baseline of the existing process at the sector level across APL. The grant proposal process at APL has not been restructured since 2003, yet major IT platforms that can support process changes are currently being developed and will be online in 2018. This capstone project analyzed the current grant proposal process, mapped these processes with the organizational

structures supporting them, and considered the positioning of compliance controls. This research identified opportunities for process structure and workflow improvements.

1.6. Exclusions and Limitations

The survey technique used to gather data for this capstone paper falls into the non-probability sampling methods family. This approach is appropriate and valuable for this investigation because this research activity represents an initial exploration of the grants bids and proposals topic at APL. This survey was designed as a census of the target population of APL staff involved in grant bids and proposals. This survey technique assumes that the characteristics being measured are evenly distributed in the respondent population.

The researcher identified respondents through review of the respondents' published functional roles in research administration. Participation in the survey was voluntary, and response rates did not exceed 85% for any subclass in the population.⁸ Limitations in the approach may include having an incomplete sampling frame, bias, and hidden variables. However, the research did not find these limitations in the participant responses. Nevertheless, non-probability sampling methods are preferred when the objective of the research is to generate testable hypotheses, as is the case in exploratory research.

⁸ U.S. Department of Education, *Survey Methods for Educators: Analysis and Reporting of Survey Data (part 3 of 3)* (2016), accessed March 17, 2018, <https://files.eric.ed.gov/fulltext/ED567753.pdf>.

Chapter 2. Literature Review

The literature review for this research topic investigated: 1) management and organizational systems; 2) the impact of IT; 3) emergence of service-oriented management, and 4) the adoption of shared services centers.

2.1. Historical Perspective on Tensions in Information Management and Organization Systems

Since the mid-1960s, organizations have faced the dilemma of processing information from divergent frames of reference, which arise not only from external and internal events but also by using communications technologies of varying efficiency. These processing dilemmas can result in disagreement, ambiguity, and uncertainty. Daft and Lengel identify the communication media available and explain how management must interpret complex problems and create an “acceptable level of order to provide direction, procedures, adequate coupling, clear data, and decision guidelines for respondents.”⁹ According to Daft and Lengel, communication media include “face-to-face discussion, phone calls, letters, written documents, and numeric documents.”¹⁰ Figure 1 illustrates how different types of media vary in richness and formality. The pace of information exchange and the complexity and richness of information media has risen rapidly. Video conferencing, email, instant messaging, and social media platforms were communication methods that Daft and Lengel did not study, and possibly did not even imagine. According to McCallister and Miller, “clear communication between researchers and research administrators fosters a partnership between the two groups that can help minimize

⁹ Richard Daft and Robert Lengel, *Information Richness: A New Approach to Managerial Behavior and Organizational Design* (College Station, TX: Texas A&M University, 1983), Page 1.

¹⁰ Ibid, Page 11.

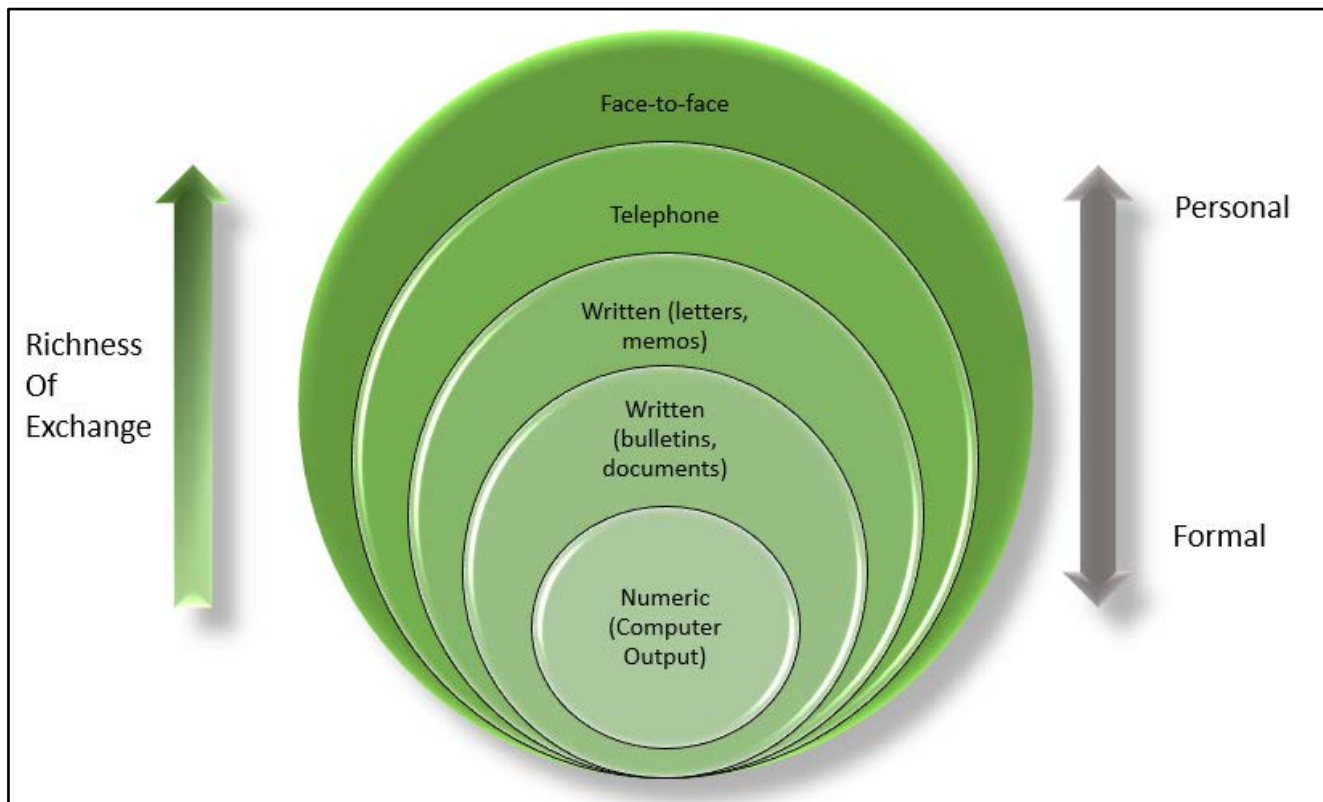


Figure 1. Communication Media and Information Richness Model¹¹

problems in the proposal process and post-award process.”¹²

Today, organizations rely on these new communication technologies. The new platforms offer enhanced richness, which moves them closer to the top of the paradigm described in Figure 1. Although face-to-face communication is still considered the richest form of communication, a video conference is a richer form of communication than merely talking via a handset telephone. The improved timeliness of written communication around the globe, whether by text or email, has dramatically enhanced the efficiency of written communications. Graphical user interfaces (GUIs), dashboards, and dynamic data presentations have made the bland computer reports of yesteryear come alive with results that can be manipulated by the recipient in real time.

¹¹Richard Daft and Robert Lengel, *Information Richness: A New Approach to Managerial Behavior and Organizational Design* (College Station, TX: Texas A&M University, 1983), 3.

¹² Michael McCallister and Charles Miller, "Forging Partnerships between Researchers and Research Administrators through Orientation Programs," *SRA Journal* XXV (1993).

Therefore, having the most modern and functional communication technologies available is vital to the problem-solving, and problem-prevention roles research administrators play.

2.2. Modern Perspectives

In recent times, the concept of organizational strategic flexibility that allows for the creation and execution of strategic options has come to the forefront. Several industry-leading companies have adopted this approach, and recent management literature reviews have focused on it. Danilo Brozovic identifies changes in the business environment as the trigger for exercising strategic flexibility within a firm.¹³ Robert Simon explains how new technologies and information technologies have forced a shift in the traditional boundaries of how firms operate. Today's managers must change the design of their organizations to cope with challenges as their business evolves and must have the flexibility to incorporate new tools as these become available.¹⁴ Robert Duncan defines the organizational structure as "more than boxes on a chart; it is a pattern of interactions and coordination that links technology, tasks, and human components of the organization to ensure that the organization accomplishes its purpose."¹⁵

¹³ Danilo Brozovic, "Strategic Flexibility: A Review of the Literature," *International Journal of Management Reviews*, 20 (January, 2018): 3-31, accessed February 10, 2018, <http://onlinelibrary.wiley.com/doi/10.1111/ijmr.2018.20.issue-1/issuetoc>

¹⁴ Robert Simons, *Levers of Organization Design: How Managers Use Accountability Systems for Greater Performance and Commitment* (Boston, MA: Harvard Business School Press, 2005), 2.

¹⁵ Robert Duncan, "What Is the Right Organization Structure? Decision Tree Analysis Provides the Answer," *Organizational Dynamics*, Winter 1979, 59.

2.3. Tension in Organizational Design

The literature identifies major movements, or eras, in organizational design. Anand and Daft hold that from the 1800s until the late 1970s (Era 1), the ideal organization was self-contained. This culminated with the emergence of the divisional structure used in organizations such as General Electric, United Technologies, or General Motors, which is seen as the most complex form of this class of design.¹⁶ Key characteristics of Era 1 include a) grouping people into functions; b) determining the reporting relationship between people and between departments; and c) the overall system to coordinate and integrate the organization's activities both horizontally and vertically. Designs from this period include functional, divisional, and matrix systems.¹⁷

According to Anand and Daft, the second era of organizational design began in the 1980s. The need for change derived from increasing organizational complexity and increasing information processing capacity across the organizational structure. Era 2 represents the adoption of a horizontal organization design whose hallmark is dispensing with the internal boundaries that impede business performance and emphasizing re-engineering along workflow processes to create a closer and more responsive contact with customers.¹⁸

Research administration has followed the same shift. In the 1980s, research administration “was conducted primarily in higher education, industry, for-profit, and not-for-

¹⁶ N. Anand and Richard Daft, "What Is the Right Organization Design?" in *Leading Organizations: Perspectives for a New Era, Second Edition*. ed. Gill Robinson Hickman (Thousand Oaks, CA: Sage Publications, Inc. 2010). 308.

¹⁷ Anand and Daft, "What Is the Right," 308.

¹⁸ Anand and Daft, "What Is the Right," 310.

profit institutes, medical research institutions, government research agencies and laboratories”¹⁹ for government-funded contracts and grants. The growth of research administration as a field was caused by the increasing complexity of managing how research funding was spent. Increased federal compliance regulations required additional research administration staff with expertise in the field. Duties have evolved such that an overall responsible administrator leads groups of specialists in required areas. These areas, whether functional, divisional, or matrixed, must coordinate activities to achieve institutional goals. Additionally, the information processing capability of electronic research administration systems, has made grant information, application guidelines and forms, electronic submission and proposals tracking, instant reports of expenditures, and schedules for reporting available in real time. This, in tandem with electronic communications capabilities, has created a closer and more responsive contact of research administrators with researchers.

2.4. Management Structure Options: Centralized vs. Decentralized

The literature makes it clear that it is essential to apply the management method that best fits the needs of the organization. As Carl Dickson of Capture Planning states, “There is no single approach that is right for everyone.”²⁰ Therefore, a careful needs assessment must be conducted, and a determination made as to the right management structure.

¹⁹ Kenneth L. Beasley, "The History of Research Administration," in *Research Administration and Management*, by Elliott C. Kulikowski and Lynne U. Chronister (Sudbury, MA: Jones and Bartlett, 2006), 27.

²⁰ Carl Dickson, "5 Alternatives to the Classical Proposal Management Model and 11 Considerations for How to Choose What's Best for You," PropLibrary, accessed February 23, 2018, https://proplibrary.com/proplibrary/item/718-5-alternatives-to-the-classical-proposal-management-model-and-11-considerations-for-how-to-choose-what's-best-for-you/?utm_source=LIBroadcast&utm_campaign=LI021218&utm_medium=social.

2.4.1. Centralized Organizational Structure

A centralized organizational structure is broadly defined as a structure in which decision-making authority is top-down and firmly rests with senior management. A centralized structure establishes a specific hierarchy to implement policies and procedures and create economies of scale. Several industries lend themselves to this type of management structure. An excellent example of an industry for which a centralized structure works best is fast food outlets. Jim Riley in his online Business Topic Video explains that a centralized decision-making hierarchy ensures that customers have the same experience at every outlet.²¹ Products can be purchased and delivered in bulk, thus creating economies of scale, reducing operating costs, and ensuring consistent product presentation.

There can be some disadvantages to a centralized structure. Because of its hierarchical structure, decision-making can be slow. Concurrently, line employees can feel as if they have no autonomy and become less motivated to perform their jobs optimally. Figure 2 outlines the possible benefits and drawbacks of the centralized organizational structure.

Centralized organizational structures are typically used in smaller research institutions with little extramural support. Pre- and post-award functions are consolidated into an Office of Research. As the benefits in Figure 2 suggest, this allows policy and oversight to remain at the central level. “The smaller research institutions have a greater need for centralization of management and administrative responsibilities. The centralized structure can avoid redundancy and promote consistency.”²²

²¹ Jim Riley, "Centralization vs. Decentralization: A Level Business," (video), April 15, 2016, accessed February 1, 2018, <https://www.youtube.com/watch?v=M1sV6YhxQD8>.

²² Chronister and Killoren, "The Organization," 58.

Possible Benefits of Centralization	Possible Drawbacks of Centralization
Uniform policies and procedures ensure consistency	Junior managers can be demotivated because of lack of authority
Collective goals achieve strategy	Executive Management is distanced from customers
Strong central management provides definitive guidance	Layers of hierarchy delays decisions
Economies of Scale save costs	Customer service at the local level is diminished

Figure 2. Potential Benefits and Drawbacks of Centralization²³

2.4.2. Decentralized Organizational Structure

At the other end of the spectrum is the decentralized management structure. This approach is broadly defined as a management structure in which the decision-making is spread out to the junior managers running various business units in a company. Riley cites chain hotels as an example: Although part of a larger chain, such as Marriott or Hilton, each hotel has an in-house management staff. The hotel staff is empowered to make on-the-spot decisions to solve customers' problems without consulting a central office. This decentralized structure has the advantage of enabling quick decision-making and providing an improved level of customer service.²⁴ This is an example of localized strategic flexibility.

There can be drawbacks to a decentralized structure. Executive leadership may have less control in the day-to-day operations of the business units. This may lead to a difference in the level of customer service received from one location in the chain to another. Junior managers may not know how to handle crisis situations that require high-level decision-making. Finally, this structure may sacrifice economies of scale because each business unit will need a manager and support staff, which can lead to redundancy in effort.

²³ Riley, "Centralization vs Decentralization."

²⁴ Ibid.

Large research institutions such as Johns Hopkins and Stanford have several sponsored program offices distributed at the department level. Each of these offices has signature authority and can submit grant applications to funding organizations. This capability allows each department to pursue opportunities that meet institutional goals without requiring several levels of pre-approval. Because of the drawbacks as indicated in Figure 3, the institution's Office of Research Administration must take on a greater coordinating, policy and oversight role to ensure accountability of researchers and research managers.²⁵

Possible Benefits of Decentralization	Possible Drawbacks of Decentralization
Empowerment motivates junior staff	Harder to ensure consistent practices and policies at each location
On-the-job training is available	Decision making in a crisis may need to be escalated
Local decision-making improves customer service	Harder to tightly control costs
Enables a flatter hierarchy	Some roles may be duplicated across the enterprise, causing dis-economies of scale

Figure 3. Benefits and Drawbacks of Decentralization²⁶

2.5. Migration to Service-Oriented Management—"Service Design"

In the 1990s, "service design" emerged as one of the many disciplines contributing to service innovation. Service design is more focused on understanding the customer, organizations, and markets and connecting their needs. With this method, organizations are seen more as "complex social systems than just as processes."²⁷ A human-centered design process focuses on

²⁵ Chronister and Killoren, "The Organization," 58.

²⁶ Riley, "Centralization vs Decentralization."

²⁷ Daniela Sangiorgi and Alison Prendiville, eds., *Designing for Service: Key Issues and New Directions* (New York, NY: Bloomsbury, 2017), 3.

understanding, mapping, and communicating the customer experience.²⁸ Technology has enhanced the movement of services from organizational systems to the design of service ecosystems. This concept, originally introduced by Lynn Shostack in 1984, argued that organizations must build on the strength of their operational systems and focus on the customer experience as a way to survive and prosper as the United States moved toward being a service economy.²⁹ According to Raymond Woodrow, research administration has been recognized as a service organization. In his view, the service mission of “research administration is to create a nourishing climate for research.”³⁰ The service mission of a research administrator has grown in scope and complexity over the years. Today, the mission includes serving the researchers who perform the work, “serving the sponsor by ensuring proper stewardship of funds and proper dissemination of results, serving the federal government by complying with research regulations and serving the people by facilitating the creation and dissemination of new technologies to their benefit.”³¹

²⁸ Ileana Stigliani and Anne-Laure Fayard, "Designing New Customer Experiences: A Study of Socio-Material Practices in Service Design," (discussion, London Imperial College Business School, June 2010: 1–31). <https://spiral.imperial.ac.uk/bitstream/10044/1/5916/1/Stigliani%202010-11.pdf>.

²⁹ Lynn Shostack, "Designing Services That Deliver," *Harvard Business Review* no. 84115 (January/February 1984): 139. Accessed March 12, 2018. <https://strategicdesignthinking.files.wordpress.com/2012/11/hbr-shostackpdf.pdf>

³⁰ Raymond J. Woodrow, *Management for Research in U.S. Universities* (Washington, DC: National Association of College and University Business Officers, 1978), 1.

³¹ Lynne Chronister and Robert Killoren, "The Organization of the Research Enterprise," in *Research Administration and Management*, by Elliott Kulakowski and Lynn Chronister (Sudbury, MA: Jones and Bartlett, 2006), 42.

2.6. IT Model for Promoting Alignment and Performance

Another consideration when designing the management of an organization is IT infrastructure and capability. It is necessary to understand what type and level of alignment contribute to improved business performance. Alignment activities are defined as “IT-business and business-IT related managerial behaviors which can enable and promote the coordination and ‘harmonization’ of activities across the business and the IT domain in ways that add business value.”³² The IT infrastructure must remain flexible and deliver solutions for business units that are customized to their needs. Therefore, businesses should be willing to invest in IT infrastructure. The implementation of mobile IT at APL, such as laptop computers, tablet computers, and mobile phones, removed even more structural friction, which added flexibility to service design options. Not only does technology facilitate research, but it also changes the way research is done. Gone are the days of performing complex calculations with slide rules. Having a robust IT infrastructure is also essential for research administrators to manage the research lifecycle. This lifecycle includes pre-award activities such as proposal preparation, application, and submission; and post-award activities including award administration and closeout.

2.7. Shared Services Centers

Organizations can choose to use a hybrid structure in which their operating units are decentralized but administrative functions are centralized. This hybridization of management structures can lead to the development of shared services centers. Kalyan Raman points out that

³² Jerry Luftman, Kalle Lyytinen and Tal ben Zvi, "Enhancing the Measurement of Information Technology (IT) Business Alignment and Its Influence on Company Performance," *Journal of Information Technology* 31, no. 1 (March 2017). Accessed February 10, 2018, <https://doi.org/10.1057/jit.2015.23>.

centralization should not be mistaken for shared services, although they are similar.³³ The University of Michigan describes shared services as “a way of organizing administrative functions to optimize the delivery of cost-effective, flexible, and reliable service to all customers.”³⁴ In a shared services environment, a typically customer-service-oriented capability is centralized within an organization, and that service is shared among other units throughout the organization. A shared services center is typically created to reduce costs, achieve process standardization, develop centers of expertise, and reduce decision times.

The private sector has been moving toward creating shared services centers to consolidate administrative functions within organizations since the beginning of the 1980s.³⁵ Several consulting companies, such as Huron, Deloitte, and PricewaterhouseCoopers, have entire handbooks on how to create shared services units that reduce costs and increase efficiency and effectiveness. Organizations such as the Shared Services and Outsourcing Network (SSON), described as “the largest and most established community of shared service and outsourcing professionals in the world,”³⁶ provide resources, conferences, webinars, and in-depth market reports to customers.

According to Ricardo Azziz, many Institutions of Higher Education (IHEs) have started to implement shared services centers “across several administrative support functions such as

³³ Kalyan Raman, "Eight ways why centralization is not shared services," *Genpact*, December 24, 2014, accessed February 23, 2018, <http://www.genpact.com/insight/blog/eight-ways-why-centralization-is-not-shared-services>.

³⁴ "What is Shared Services?" Accessed March 7, 2018. <http://ast.umich.edu/pdfs/What-is-shared-services-102811.pdf>

³⁵ Brian Squilla, Jenna Lee, and Andrew Steil, "Research Shared Services," *Journal of Research Administration* (Spring 2017): 86–98.

³⁶ International Quality & Productivity Center, "About SSON," SSON: The World's Largest Shared Services and Outsourcing Network, accessed March 18, 2018, <https://www.ssonetwork.com/>.

Facilities, IT, Human Resources (HR), Communications and Marketing, Audit, Compliance, and Risk Management,” to name some of the most common.³⁷

Shared services centers can have disadvantages. Moving to a shared services model from a decentralized management model can be painful from a change management point of view. Centralizing processes can sometimes cause bottlenecks at times of high demand. Over-standardization can lead to inflexible and bureaucratic processes. Central office administrators can become isolated and less informed about operational activities.

Over the past several years, the number of IHEs adopting some form of a shared services model has grown. In 2012, Gavan Gideon reported in the *Yale Daily News* that, according to Rowan Miranda, Associate Vice President for Finance at the University of Michigan, 12 schools in the U.S. had implemented or were implementing a shared services model at a university-wide level.³⁸ In a 2015 case study, the University of Washington identified 38 IHEs that were in the process of implementing or had implemented some form of a shared services model.³⁹

A case study on the implementation of research shared services at Thomas Jefferson University was published in the March/April 2016 edition of *NCURA Magazine*⁴⁰; it appeared in a longer format in Volume XLVIII, Number I of the Society of Research Administrators

³⁷ Ricardo Aziz, "Implementing Shared Services in Higher Education," Professional Opinion, last modified August 18, 2014, accessed March 7, 2018, <https://www.universitybusiness.com/article/shared-services>.

³⁸ Gavan Gideon, "Shared Services Gaining Ground in Higher Education," *Yale Daily News* (blog), entry posted March 23, 2012, accessed February 12, 2018.

³⁹ "University Shared Services Case Studies" (working paper, University of Washington, Seattle, WA, March 2016), Accessed February 20, 2018 <https://tap.uw.edu/sites/default/files/hrp-isc/ss-case-studies-v3.pdf>.

⁴⁰ Jenn Lee, Brian Squilla, and Andrew Steil, "Research Shared Services: A Case Study in Implementation," *NCURA Magazine* (March/April 2016): 37–39.

International's (SRI) *Journal of Research Administration*.⁴¹ The article, by Jenna Lee, Brian Squilla, and Andrew Steil, outlined the decisions an organization must make before deciding to put a shared services center in place. The authors stressed the importance of analyzing whether a shared services center might be a good fit for the institution based on customer needs and institutional goals. While many organizations may see shared services as a cost-cutting measure, it should be defined as an investment. "The return on investment for this method of service delivery transformation works by providing high levels of training, professional development, and cross-collaboration to employees, while breaking down organizational silos, and retaining PIs by delivering the services they need with a high level of quality."⁴² Once a decision has been made to proceed, however, it is critical to approach the launch "with an eye toward change management, engagement of key stakeholders, and ongoing communication and monitoring post-implementation."⁴³ The article gave an overview of the project phases, which include planning, evaluation, design, implementation, and optimization. Importantly, this analysis informs any organization of the challenges and lessons to be learned from implementation of a shared services center.

⁴¹ Brian Squilla, Jenna Lee, and Andrew Steil, "Research Shared Services: A Case Study in Implementation," *Journal of Research Administration* XLVIII, no. 1 (Spring 2017): 86–99.

⁴² Squilla, Lee, and Steil, "Research Shared," 37.

⁴³ Squilla, Lee, and Steil, "Research Shared," 86.

Chapter 3. Project Description

The question of possible inefficiency in grant proposal processing at APL has been an issue since long before the beginning of this capstone project. This project originated from internal, cross-departmental discussions that sought to clarify the roles and responsibilities, or “swim lanes,” for different APL staff associated with proposal processing and review. During those discussions, the fundamental perceived needs were a) improving proposal quality and b) removing workflow inefficiencies.

Several members of the BCSD supported this research project. The author was mentored by a leading member of the BCSD 202X strategic planning initiative and supervised loosely by the BSB (Contracts) Group management chain. IT staff members were asked to evaluate the survey technology used to ensure the privacy and security of respondents and alignment to internal APL guidelines and procedures.

A survey questionnaire was designed to measure possible causes of variability in proposal quality and compliance. It also solicited observations about recent issues in proposal workflows.

Once the questionnaire was finalized, it was cleared by APL for public release. Then, the questionnaire was submitted to the JHU Homewood Institutional Review Board (IRB), which declared this research activity exempt.

BSB staff provided key financial reporting about APL grant proposals. This data enabled quantitative analysis of the number and value of proposals processed by each APL Sector, by mission area (MA).

Points of tension in the organizational design were identified by analyzing the program Sector and Enterprise Department organization charts. Proposal preparation processes, which crossed organizational boundaries, were mapped.

The project concluded after the analytic findings were recorded in the recommendations and conclusion portion of this paper.

Chapter 4. Needs Assessment

4.1. Current Condition

The organizational structure at the JHU APL, as shown in Figure 4, initially appears to be a classical hierarchical management structure with a Central APL/Director's Office at the top. APL has four Sponsored Sectors and two Sponsored Departments, collectively referred to as Sectors, which execute sponsored programs.

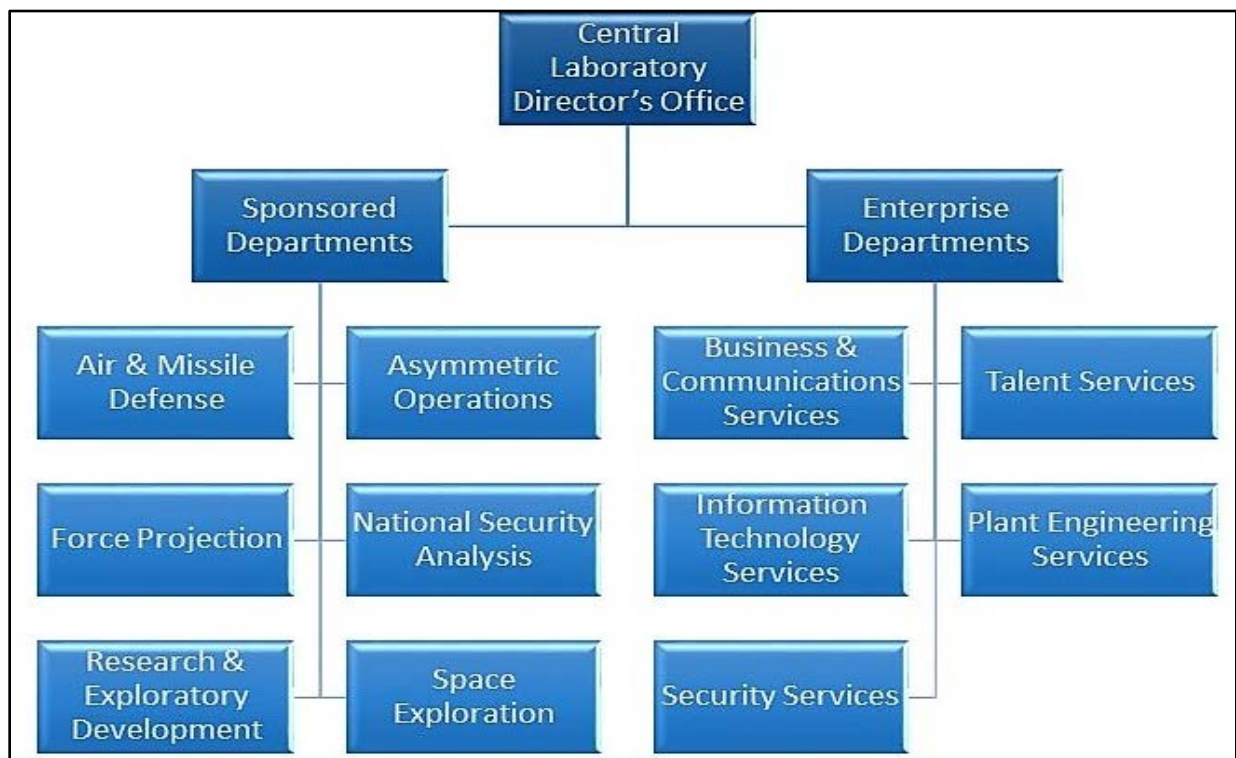


Figure 4. APL Organizational Chart as of 2/18/2018⁴⁴

The Sectors are further broken out into MAs by technical focus:

- **Air and Missile Defense Sector:** Air and Missile Defense
- **Asymmetric Operations Sector:** Cyber Operations, Special Operations, Homeland Protection

⁴⁴ <http://www.jhuapl.edu/aboutapl/organization/default.asp>

- **Force Projection Sector:** Precision Strike, Sea Control, Strategic Deterrence
- **National Security Analysis Department:** National Security Analysis
- **Research and Exploratory Development Department:** Research and Exploratory Development, National Health
- **Space Exploration Sector:** Civil Space, National Security Space

There are five Enterprise Service Departments, which provide staff and facility infrastructure:

- **Business and Communication Services**
- **Talent Services**
- **IT Services**
- **Plant Engineering Services, and**
- **Security Services**

The review of organizational structure literature in Chapter 2 indicated that the level of interaction between the Sponsored Sectors and the Enterprise Service Departments would categorize APL as a hybrid matrix organizational structure.

4.2. APL Organizational Structure Review

The Executive Council (EC) leads the upper management of APL and consists of the director, assistant directors, chief of staff, Sector heads, and Enterprise Department heads. The collaboration within the EC ensures that all organizational elements of the company are aligned to APL's Strategic Vision, based on the Lab's core purpose, goals, and vision. The EC members are responsible for translating that vision into action. This leadership structure keeps the company's efforts matched to its goals, offers clear direction and decision guidelines, and

provides an acceptable level of order and certainty, even though the MAs have unique and diverse research portfolios.

The hybrid matrix structure is mirrored within the Sponsored Departments. This structure is outlined in a simplified representation of the matrix structure in Figure 5. In this case, the Sector head is at the top. Mission area executives (MAEs), managing executives (MEs), and operations executives (OEs) are at the next level. The MAEs oversee the Program Areas, which are further broken down into functional groups and sections, which include the program managers (PMs). The MEs oversee technical functional groups, also made up of sections that are matrixed to provide subject matter expertise across the Program Areas. The OEs supervise the Business and Finance groups, also broken into sections that include the financial managers (FMs) and program management assistants (PMAs).⁴⁵ The Business and Finance groups for each Sector are matrixed to provide financial management support across the Program Areas, with dedicated FMs and PMAs supporting specific PMs.

⁴⁵ The Space Exploration Sector does not employ PMAs.

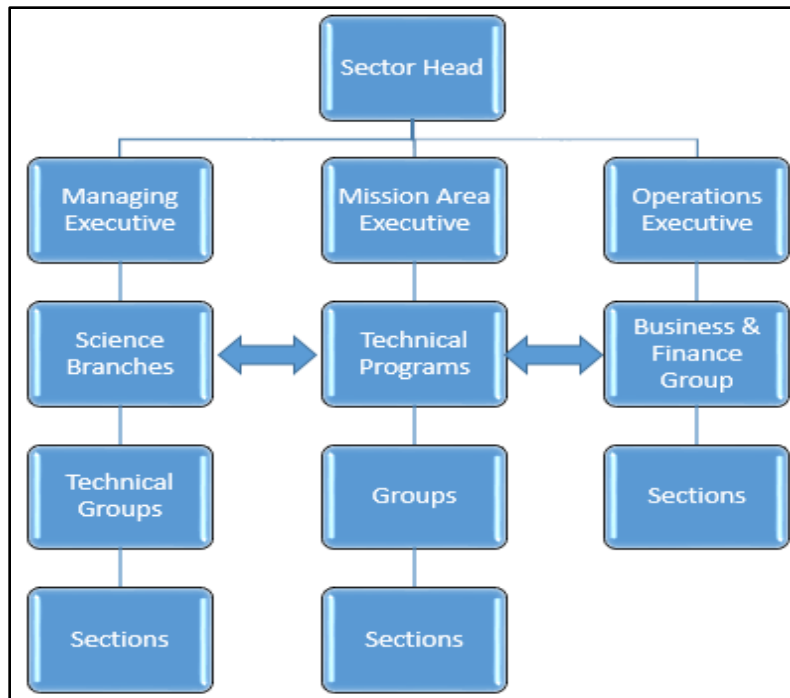


Figure 5. Simplified Sector Organization Chart (showing how Business and Finance Groups informally report to Technical Program Areas and how Technical Program Areas draw expertise from Sector Science Branches)

As in the Sponsored Sectors, each Enterprise Service Department head is at the top and oversees functional groups, which are further broken into sections. These organizations provide their services across the entire APL enterprise.

4.3. Proposal Development Model

PMs are instrumental in sponsor engagement. They focus on Agency Programs, understand their research objectives, and decide if APL should target specific work. Once a solicitation is targeted and the MAE makes a bid decision, the PM or PI is responsible for the technical development of ensuing proposals. Bids and Proposals (B&P) funding is provisioned, and a risk assessment is initiated.

B&P funding underwrites the time and resources required to develop the proposal. Proposal development teams may consist of PMs, project managers (PjMs), principal investigators (PIs), other research team members, FMs, and PMAs from the Sectors. Indirect cost accounts pay for GMs, sub-contracts managers (S-CMs), Procurement, Security, and IT, as necessary, from the Enterprise Departments. After B&P funding has been assigned to a project, the proposal development process begins.

Sponsored Sectors conduct grant proposal development in slightly different ways. The Research and Exploratory Development Department's (REDD) model's key differentiating feature is an emphasis on synchronized starts, and is described below.

The REDD FM and PMA pull together a broader proposal team and conduct a kickoff meeting with all participants in the proposal process. This team can include cross-organizational respondents from the Enterprise Service Departments, including the GM, S-CM, and Procurement, Facilities, IT, and Security Services representatives if required. These meetings are generally conducted in person. However, in recent years, this collaboration has been facilitated by the emergence of electronic meeting platforms at APL, such as WebEx. These platforms are used to include participants across campus, across the country, and globally.

The FM is responsible for formulating the proposal budget in accordance with the solicitation, internal APL requirements, and any cost elements required by the PM to accomplish the statement of work (SOW). The PMA provides programmatic, administrative, and operational support to PMs. They assist FMs with proposal development by completing electronic application forms, reviewing the SOW/technical section for typographical or formatting errors, and obtaining quotations for travel, equipment and supply items, etc. In summary, the FM and PMA collaborate to assemble all the proposal components for internal routing using the ERT.

4.4. The Grant Proposal Review Process

All Sectors follow a standard proposal review process. Technical staff reviews the proposal's technical section first. The level of review is determined by the dollar value and the complexity of the proposal (e.g., multi-institutional, international participation). Thus, a proposal may be reviewed at several technical levels, including the PM, the PI's line supervisor, Program Area managers, branch managers, or chief scientists. The focal point of this review is technical responsiveness to the solicitation and scientific content. This is Lane One in the Swim Lane Workflow process, as described in Figure 6.

Next, the Business and Financial Group management review the proposal. Again, depending on the dollar value and complexity, the FM's line supervisor, Financial Group supervisor, or OE may review the proposal. This level of review is concerned with the budget and budget justification, ensuring compliance with the solicitation, federal regulation, and internal APL G&Ps for cost allowability, costing accuracy, and cost reasonableness. This is Lane Two in the Swim Lane Workflow process.

The GM in the BCSD Contracts Group reviews the proposal next. This review is concerned with overall proposal compliance to the solicitation, applicable federal regulations, and internal APL G&Ps. This is the final review before institutional endorsement. This is Lane Three in the Swim Lane Workflow process.

Lane Four in the Swim Lane Workflow process is for final institutional endorsement, which is received from the MAE or Assistant Director of Programs, depending on the dollar value and any other special review conditions (e.g., human/animal research, high-risk

categories). The final endorsement relies on previous reviewers to ensure the technical validity, financial fidelity, and compliance conformity for each proposal that leaves APL.

4.5. Internal Proposal Routing

Internal proposal routing relies on the ERT, a web-based application that was introduced circa 2010 to relieve the previous administrative and physical burden of routing proposals. Previously, proposal managers were required to hand-carry proposal folders to each reviewer for sign-off. The existing structure is a direct result of the linear workflow process imposed by the capabilities of ERT. Figure 6 illustrates how the ERT creates a linear “swim lane” process flow.

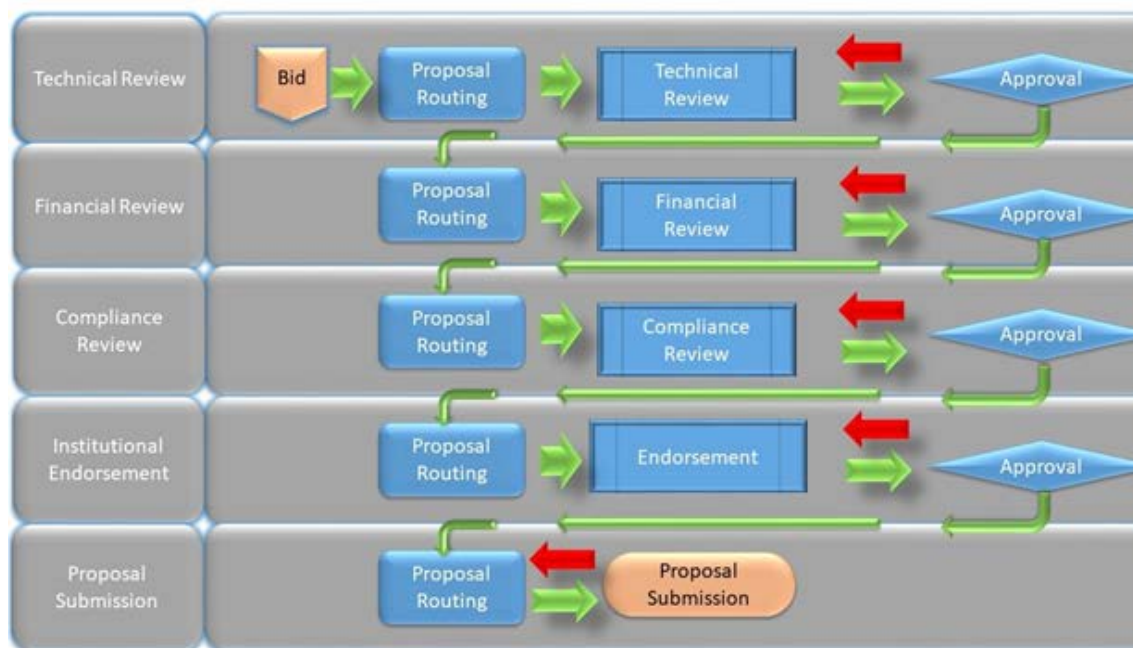


Figure 6. APL Proposal Review "Swim Lanes"

Proposal reviews are determined at the Sector management level; however, the proposal initiator can bypass or substitute a reviewer, if necessary. The ERT system generates an email alerting reviewers that a proposal is ready for review. When the first reviewer has completed their review, a system-generated email alerts the next reviewer, and so on, until the proposal has

passed through all reviewers. Each reviewer can enter comments related to their proposal review and reject a proposal back to the initiator for corrections. Finally, the institutional endorsement is secured, and the proposal is submitted to the sponsor.

As the ERT system has no system-to-system (S2S) capability, proposals are submitted by the GM, who acts as an Authorized Organization Representative (AOR), or by a Sector FM who has been specifically delegated the necessary authority. Finalized proposals are submitted either by email or through an electronic submission system, such as, but not limited to, Grants.gov, the National Aeronautical and Space Administration Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), or FastLane.

4.6. Grant Operations

Federal assistance awards (grants and cooperative agreements, referred to collectively as grants) are a small but integral part of APL's business operations. Federal grant revenues represent approximately \$25M of revenue per year.⁴⁶ Grants provide essential funding for fundamental scientific research and development.

Workflows initiate from the Sector teams and transition through multiple organizational matrix elements. Information rises in the Sector vertically to secure management approvals and quality control. Information also travels horizontally to reach the enterprise services groups for inputs and compliance checks. A fundamental challenge is that only the current reviewer has access to proposal information while proposal packages are in the vertical or horizontal approval processes. All other reviewers are locked out.

⁴⁶Michael Dolan, "Contract, Grant & IPA Status Report," last modified February 13, 2018, PDF.

The two-person grant management team at APL (one of whom is the author of this paper) provides many of the grant research administration services offered by a Sponsored Projects Office (SPO) in a university structure. The grants management team is housed in the BCSD, and the team members are designated as APL's AORs responsible for final grant application submissions to sponsoring agencies. Therefore, end-to-end grant-processing workflows traverse through the organization's hybrid matrix structure for Sponsored Sectors and Enterprise Service Departments.

4.7. Key Gaps

Understanding of end-to-end grant-processing workflows and internal guidelines and procedures is uneven across APL's Sectors. Figure 7 describes a core issue: Grant proposal volume varies significantly between Sectors. At one end of the scale, a high-volume Sector has had up to 14 proposals due on the same day, whereas other Sectors process only a few grant proposals, fewer than ten per year. Figure 7 shows how, over a three year grant period, from fiscal year 2015 to 2018, 656 proposals were submitted for funding consideration to outside funders. 75.3% of the proposals were submitted by SES. SES averages approximately 165 proposals per year. This stands in contrast to FPS, AMDS, and NSAD which each averaged one proposal per year during the same period. The sizeable yearly volume of grant proposals prepared by SES suggests that they would benefit from additional research administration assistance during peak proposal preparation periods.

Sector	Grants FY2015-2018*	Percent of Grants Proposals
FPS	4	0.6%
AOS	33	5.0%
AMDS	4	0.6%
NSAD	4	0.6%
REDD	116	17.7%
SES	495	75.3%
Other	1	0.2%

Figure 7 Grant Proposal Volume by Sector, Multi-Year⁴⁷

High-volume activity can lead to a compressed processing time for each proposal and rushed reviews, which may miss proposal errors. Low-volume Sectors may be less familiar with end-to-end processing procedures, which can lead to excessive processing time, ineffective action, staff frustration, and inconsistency in the quality and completeness of grant applications. Internal symptoms include failure to follow correct workflows or generate required documentation, poor understanding of associated APL G&Ps, and excessive rework. External symptoms of these inefficient behaviors include missed deadlines, non-responsive proposals, or additional processing after the award to answer sponsor fact-finding questions.

4.8. Needs Assessment Process

The needs assessment process was intended to identify the loci of weaknesses in the existing system. The observational survey tool tested three perspectives:

- Perceived needs—what people think about their needs
- Expressed needs—the number of people who have sought help and why

⁴⁷ Dolan, "Contract, Grant."

- Relative needs—identification of organizations that are less familiar with grant processing

A web-based Google Forms tool was used to create a survey questionnaire, which the author of this study targeted at PMs, PIs, FMs, PMAs, contracts managers (CMs), and S-CMs.

The literature review analyzed organizational structure options. Opportunities for information synchronization, effective quality control, and end-to-end cycle efficiency were sought.

The survey method and analysis of organizational structures are the two primary methods by which inefficiencies in the existing processes were identified, and options for future processes were determined. Financial data was used to baseline each Sector's grant proposal volume.

Chapter 5. Methodology

This chapter describes the methodologies used to gather data about the organizational structure of APL, literature about organizational design and workflow processes, and survey data from potential respondents in grant proposal workflow processes.

5.1. Design of the Methodologies

5.1.1. Structure

To document the organizational structure of APL and its business Sectors, each Sector's internal website was accessed to establish its own organizational structure. A side-by-side comparison was performed to verify that each structure consisted of a Sector head, MAE(s), OE, MEs, PMs, FMs, and PMAs. Organizational design was consistent, save that the Space Exploration Sector does not employ PMAs.

A literature review was conducted from a wide variety of samples, including sponsored studies, book chapters, articles published in peer-reviewed journals, research administration magazines and journals, and blogs, videos, and other online publications. The sampled literature covered a period from 1983 to 2018. Observations were made about how organizational design principles have changed over this time.

5.1.2. Workflows

Current proposal processing workflows were documented. Process diagrams for APL's electronic research administration system, essential for exchanging information, were examined. These process diagrams were created to aid in the design of APL's next-generation enterprise resource planning (ERP) system, which is currently under construction. The method of selecting reviewers, their roles, and their order in the sign-off sequence were determined. The key roles

were technical review, financial review, quality control and compliance, and final signature. After a bid decision is made, these workflows and review roles are triggered. Proposals range from simple to complex undertakings. Examining end-to-end processing and how it crosses the organizational structure exposed where control activities were positioned. Finally, analysis of internal proposal statistics was performed to gauge the proposal workload across the Sectors.

5.1.3. Survey

A web-based Google Form tool was used to design a survey questionnaire, relying on methods described by Ashley Crossman in “Constructing a Questionnaire.”⁴⁸ Before the questionnaire was issued to targeted respondents, the questions were reviewed by the researcher’s project mentor, who is the BCSD 202X PM, and BSB Group supervisors. Ensuing changes were incorporated into the final draft. The questionnaire was reviewed for public release by APL and then submitted to and approved by the JHU Homewood IRB.

The questionnaire was issued to APL staff across the Sponsored Sectors and BCSD to collect data from stakeholders in the proposal process. An electronic questionnaire had the advantage of giving respondents a way to respond quickly. This method provided a modern, inexpensive way to reach a large number of respondents distributed broadly across the APL enterprise in a short time. The resulting responses were easily compiled in the survey platform.

5.1.4. Survey Design

The first series of questions characterized the respondents by identifying their current position at APL, the number of years they had worked in that position, the total number of years

⁴⁸ Ashley Crossman, "Constructing a Questionnaire," ThoughtCo, last modified March 23, 2017, accessed January 23, 2018, <https://www.thoughtco.com/constructing-a-questionnaire-3026540>.

employed at APL, the Sector in which they currently worked, and any Sectors in which they had previously worked. Questions also sought to identify the respondent's level of involvement with proposal processing by determining the number of proposals they prepared in the last year.

The next set of questions was designed to identify training needs by asking respondents how familiar they were with APL G&P documents. This section also asked if respondents had requested any changes to any part of certain G&P documents.

The final section targeted respondents' perceived needs by asking if they anticipated growth in the rate of future grant proposals and whether their Sectors' current capabilities were sufficient to handle that additional workload. A related question sought data about program office dependence on other APL organizations for critical proposal preparation steps.

Respondents were also asked open-ended questions that allowed them to give opinions about what changes should be made to existing processes. Based on the results, alternative processing methods, the positioning of the BCSD grant review team, and internal controls based on organizational hierarchy were evaluated.

Analysis of the survey data included compiling statistical demographic information about the survey respondents. Data elements included current position, number of years in the current role, number of years at APL, and current and previous work sector(s); respondents' understanding of the current grant proposal process; and free-form text observations. Observations were matched to APL organizational structures, work processes, and work roles, as appropriate. Responses to questions specifically related to contract proposals were not used, as this paper focused on grant proposals. Survey results were evaluated to identify possible process

changes that would mitigate the risk of submission of non-compliant proposals or proposals with errors.

5.1.5. Survey Respondents

A survey was issued to APL employees in targeted groups who prepared or reviewed competitive proposal applications to funding agencies. The survey was sent out to 397 employees, and responses were received from 123 employees, or 31%, of targeted employees before the survey period ended.

Respondents included six PMs and 40 PI's representing staff who prepare and review the technical section of proposals, 31 FMs who prepare the proposal budgets and budget justifications, 12 PMAs who provide administrative support by editing technical write-ups, and obtaining information to complete application forms, 7 CM/GMs who review solicitations to determine eligibility and review proposals to ensure application compliance, 7 Sub-CMs who work with partner institutions to request proposals for inclusion in APL's prime application submission. 19 "other" respondents did not fall into the targeted positions but may participate in the grant proposal preparation process.

Job Title	Respondents
Program Manager (PM)	6
Principal Investigator (PI)	40
Financial Manager (FM)	31
Program Management Assistant (PMA)	13
Contract/Grant Manager (CM, GM)	7
Sub-Contract Manager (Sub-CM)	7
Others	19

Figure 8. Respondents' Job Titles and Distribution

Chapter 6. Project Results

6.1. Survey Questionnaire Results

The survey was launched twice to encourage greater participation by targeted employees. Figure 9 shows how peak response periods were typically within 24 hours of each launch. The first day of each launch resulted in the most responses, with a sharp decline the day after.

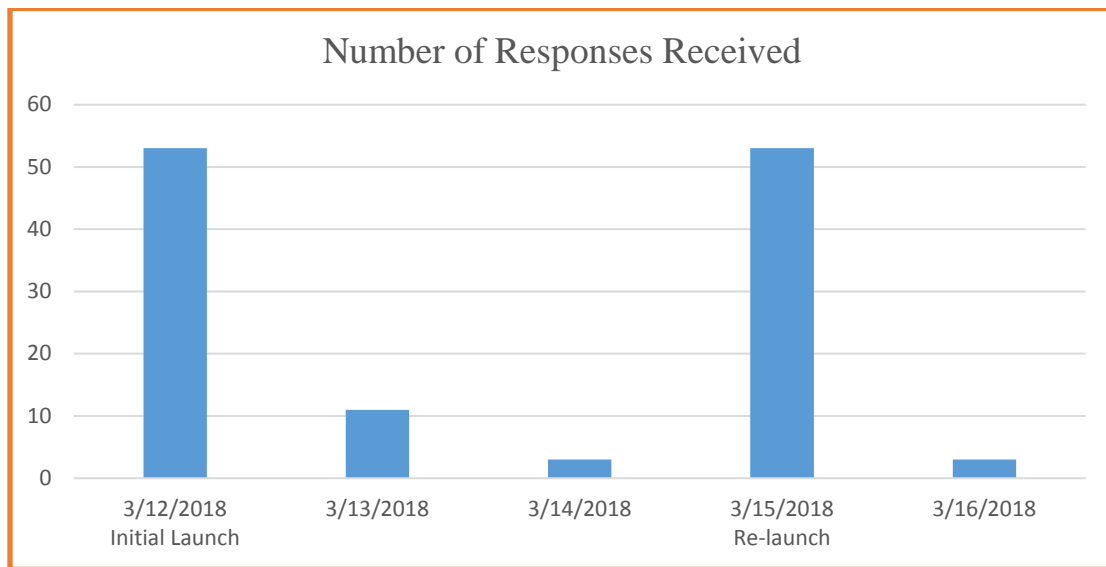


Figure 9. Number of Responses Received over a Five-Day Period (showing a sharp decline in responses 24 hours after each survey launch)

6.1.1. Analysis of Demographics: Respondent Characterization Questions

Question one asked the respondents what their current role is at APL. The response set includes information from 104 employees that were in the six targeted roles. Figure 10 shows that 57.7% of responses were received primarily from PIs (32.5%) and FMs (25.2%), while 10.6% of respondents were PMAs, 5.7% were Contract/Grant Managers, 4.9% were Program Managers, and 5.7% were Subcontract Managers. The remaining 15.4% were combined into an “other” category.

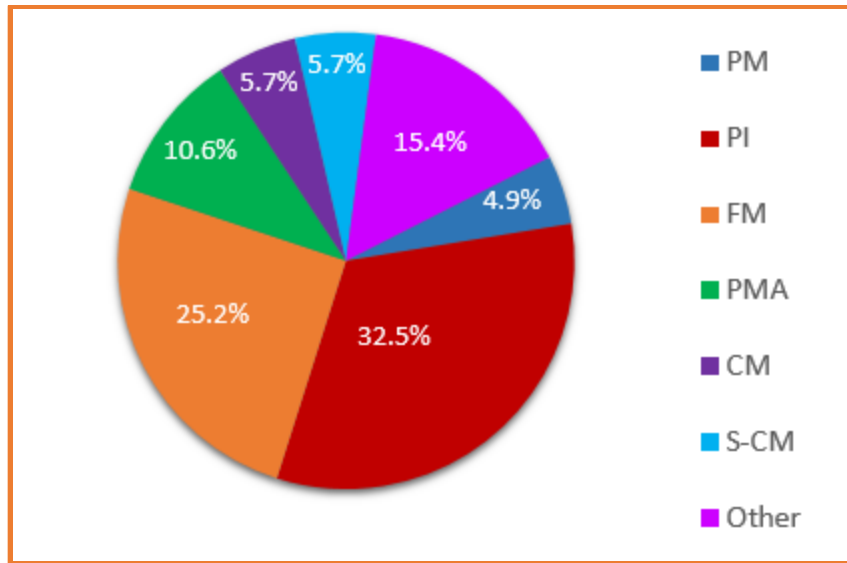


Figure 10. Respondents' Current Positions at APL

These results indicate that the survey was distributed widely enough because responses were received from employees in all the targeted roles (PM, PI, FM, PMA, CM, and S-CM).

Question two asked how long each respondent had worked in their current position. Figure 11 shows that 52 of 123 respondents had been in the same position for more than ten years. Thus 42.3% of the respondents had substantial experience in working with grants and contracts. 43 respondents (35%) had less than three years of experience in their current position. These two sets of respondents allowed the researcher to identify experience in the field as an important variable in the analysis of proposal workload and processes.

The remaining groups, listed in Figure 11, reported being in their current position for 4-6 years, 16 respondents (13%); and 7–9 years, 12 respondents (9.8%).

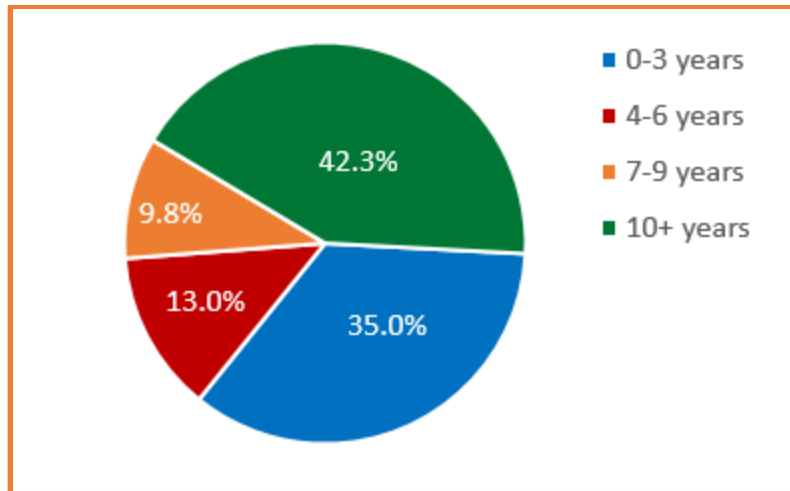


Figure 11. How Long Respondents Have Worked in Their Current Positions

Question three asked how long the respondent had been employed at APL. Of the 123 respondents, 63 (51.2%) had worked at APL for ten years or more. Figure 12 shows that the next largest group, 31 (25.2%), had been at APL for three years or less. Other subsets included 17 respondents (13.8%) employed for 7–9 years and 11 respondents (8.9%) at APL for 4–6 years. One respondent chose not to answer the questions and was not included in Figure 12.

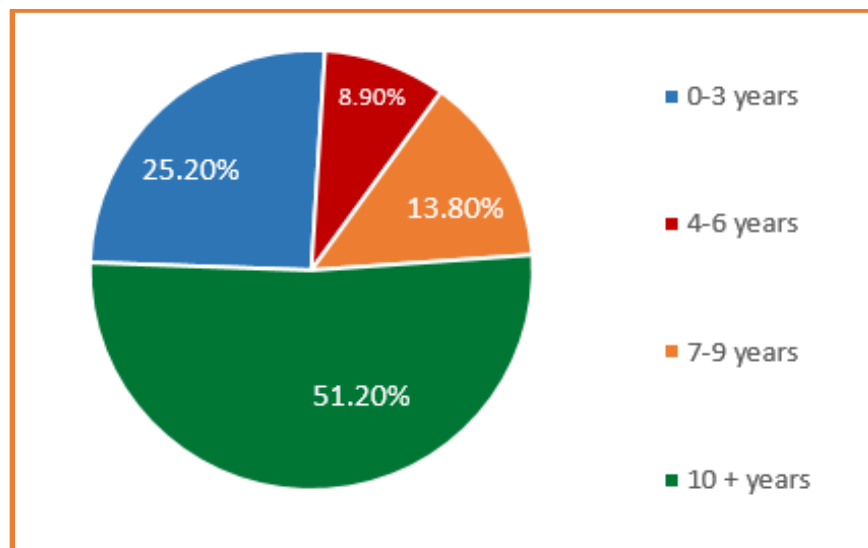


Figure 12. How Long Respondents Have Been Employed at APL

Question four asked respondents to identify in which Sector they were currently employed. This question segments responses to either an originating Sector or an Enterprise Service Department. Of the 123 responses, 44 (35.8 %) were in the Space Exploration Sector (SES); 25 (20.3%) were in the Asymmetric Operations Sector (AOS), 16 (13%) were in REDD; 12 (9.8%) were in the Force Projection Sector (FPS); 6 (4.9%) were in the Air and Missile Defense Sector (AMDS), and 4 (4.3%) were in the National Security Analysis Department (NSAD). Fifteen (12.2%) respondents replied “Other,” which represents the Enterprise Service Departments. One respondent did not identify a sector.

APL’s SES, AOS and REDD sectors, 69% of respondents shown in Figure 13, were the top three grant proposal submitting sectors on an annual basis. Combined they represent 98% of all grant proposals submitted during FY 2015-2018, as previously shown in Figure 7. This is an important finding because it shows that survey responses were received from the key grant proposal producing sectors.

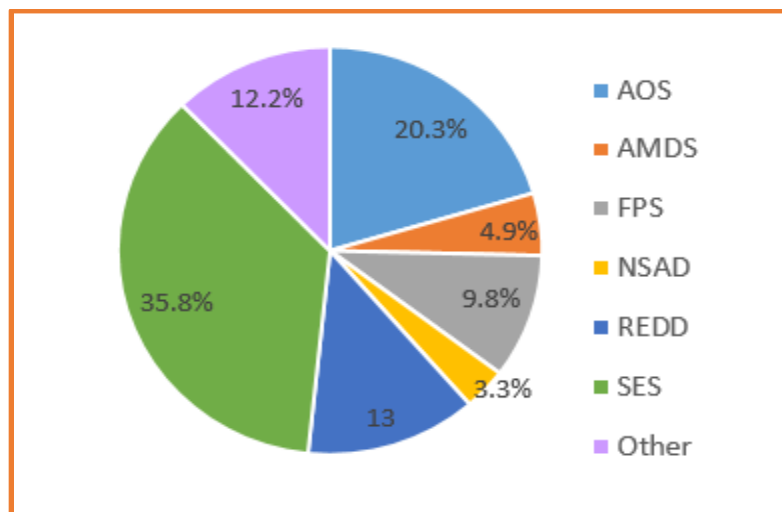


Figure 13. Sector in Which Respondents Are Currently Employed

Question five requested that respondents identify all the Sectors in which they have worked at APL. All six targeted sectors and BCSD were represented in the responses. 123 respondents provided 160 affiliations, eight respondents declined to answer or fell into the “other” category. Of the 160 selected affiliations, 115 are attributable to respondents’ current positions. Therefore, there are 45 affiliations selected beyond current assignments. Analysis indicates that up to 39% of responses are informed by professional experiences that cross organizational boundaries. This data suggests responses may benefit from diversity in experiences.

Question six asked if respondents were involved in the proposal preparation process. Respondents who did not participate in proposal preparation were asked to stop taking the survey at this point. As Figure 14 shows, of 123 respondents, 31 (25.2%) stated that they did not presently participate at all in the grants proposal process. Five respondents did not follow the instruction to stop, as was evident in the absolute response measures in follow-on questions; however, there was 83.9% compliance with the request to stop. This indicates that the remaining survey data was provided by APL staff who are active in proposal processes which, in turn, assures current and potentially valuable insights from their responses.

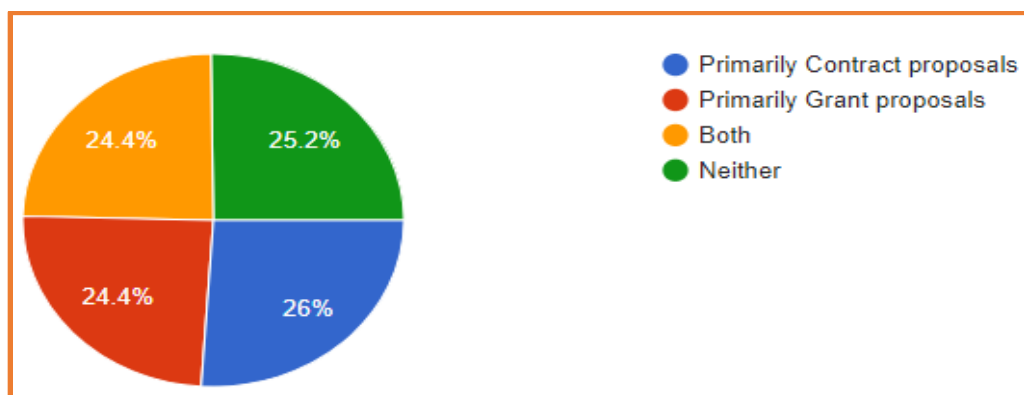


Figure 14. Respondents' Involvement with Proposal Preparation

Question seven asked respondents to approximate how many grant proposals they prepared in the last year and measured their familiarity and currency with the grant proposal process. The 97 respondents, shown in Figure 15, included at least five respondents who should not have continued with the survey. Additionally, 26 other respondents who only prepared contract proposals were identified. The result is that 66 respondents provided the data used in Figure 15.

The estimate for the number of grant proposals by Sector over the past year was derived by using the 2017 grant proposals value in Figure 23 and multiplying it by the FY2015-2018 distribution percentage by Sector in Figure 7. This estimate does not account for any ensuing grant proposal growth.

Analysis of individual responses, summarized in Figure 15, shows that AMDS was not represented and that SES responses made up 59% of the dataset. It was very likely that over 50% of grant proposals processed by FPS, NSAD, AOS, and REDD in the past year were represented in this data. There was more uncertainty with SES data because the survey only asked for a range of numbers, not a specific number, of how many proposals were prepared in the last year. However, two SES respondents fell into the highest range of proposals prepared, and 37 SES respondents fell in the next range. SES respondents included 24 individuals, who had been in their current position for ten years or more and had prepared grant proposals in the last year.

By using a rule that only one financial manager would process any one grant, the data covers, at a minimum, the range of 49 – 89 grant proposals prepared in the last year. This range significantly understated the likely number of grant proposals represented in this data set. Two SES FM's are responsible for all grants in that Sector and, as stated above, the survey data captured two respondents who fell in the highest range of proposal preparation rates. The range

count assumes these individuals were only responsible for 32 proposals whereas that number was likely much higher. SES was estimated to have produced 191(rounded) grant proposals over the last year. This analysis indicated that SES FMs could benefit from supplemental research administration staffing, especially during proposal production spikes caused by targeting specific solicitations. A future survey could be designed to improve traceability between grant proposals and staff associated with them.

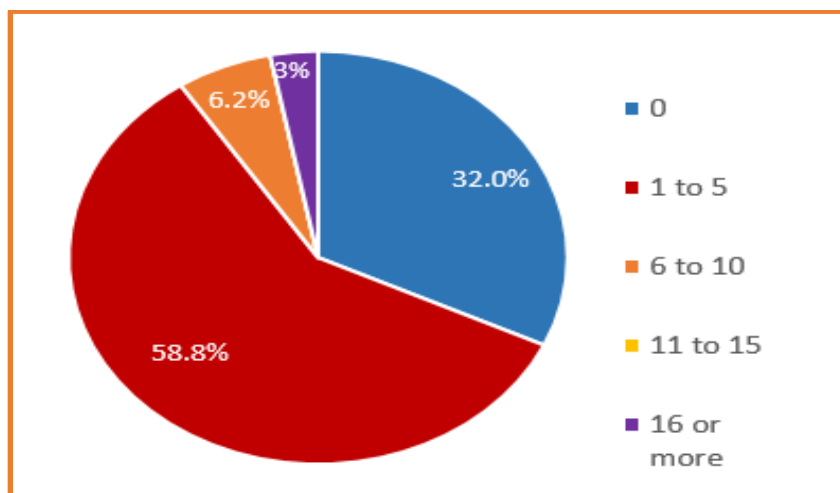


Figure 15. Number of Grant Proposals Prepared in the Last Year

Question eight asked respondents to approximate how many contract proposals they prepared in the last year. These responses were discarded as beyond the scope of this paper because this paper focused on grant proposals.

6.1.2. Analysis of Process Responses

Questions 9, 10, and 11 asked respondents to indicate on a scale of 1–4, with one being “Not very familiar” and four being “Expert,” how familiar they were with various internal APL G&P documents related to proposal processing. The first two policy documents, G&P 001-0037 – Management Review of Proposals, and G&P 13-0009 – APL Cost Estimating Manual, apply to

both contract and grant proposals, and the last G&P, 13-0007 – Grant and Cooperative Agreements, applies specifically to grants and cooperative agreements. There were 102 responses to each question. Figure 16 shows these results. Responses indicated a knowledge gap about internal policy, especially those policies which applied to grants and cooperative agreements. Weak awareness of APL G&Ps can be consequential. Failure to follow Management Review policy may result in an invalid proposal or processing delays. Failure to follow the Cost Estimating guidelines can result in cost proposals being generated using incorrect cost models or missing required basis of estimate documentation, creating the possibility of financial losses. As APL performs most of its work under contract, failure to follow the guidance in the Grant and Cooperative Agreement G&P can result in work being categorized incorrectly which may require that the proposal be redone as a contract proposal.

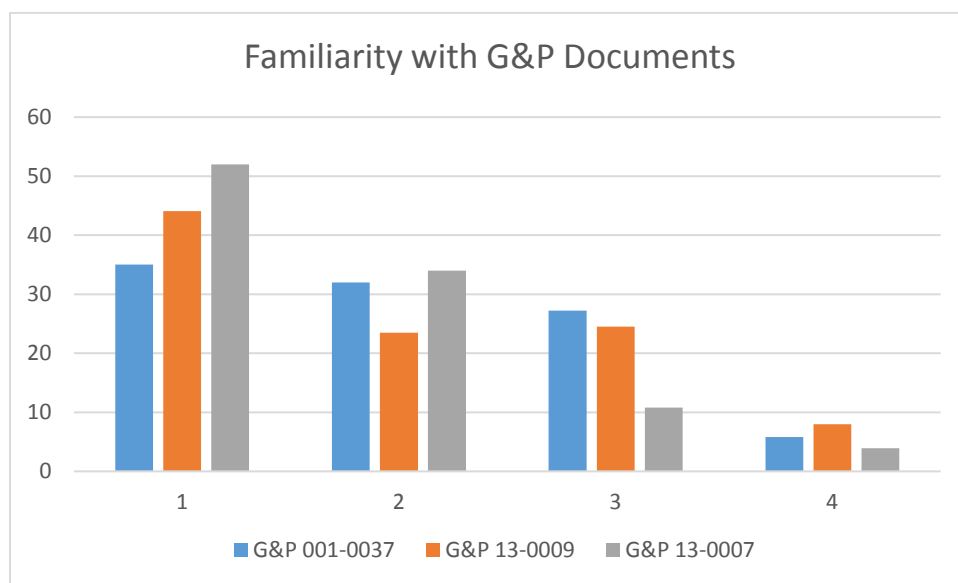


Figure 16. Familiarity with APL Internal G&P Documents

As the FM role is critical to the enforcement of G&P requirements on the proposal process, a deeper analysis of that subset of respondents was undertaken. Of 31 FM respondents, all prepared contract proposals in the past year. Ten FMs did not prepare any grant proposals.

As expected, 84% of FM responses related to G&P 13-0009 – APL Cost Estimating Manual were in the “Very Familiar” to “Expert” range, and 48% had been in the FM role for seven or more years. Respondents who worked as an FM for 0-3 years accounted for 39% of responses, 75% of which were “Very Familiar” with the G&P.

Responses to Question 9 revealed that 65% of FM respondents were “Very Familiar” or “Expert” with G&P 001-0037 - Management Review of Proposals, and 42% of these respondents had been in the FM role for seven or more years. Respondents who worked as an FM for 0-3 years accounted for 39% of responses, 41% of which were “Very Familiar” and 58% were “Not Very Familiar” or “Familiar” with the G&P.

Responses indicating familiarity with G&P 13-0007 – Grants and Cooperative Agreements were notable. Only three FMs claim to be “Expert,” and two FMs claim to be “Very Familiar” with this G&P, which, in total, represented 16% of respondents. Most remarkable, however, was that 84% of respondents were “Not Very Familiar” or “Familiar” with this G&P. Respondents who worked as an FM for 0-3 years accounted for 39% of responses, 92% of which were “Not Very Familiar” or “Familiar” with the G&P.

The survey data indicated that Grants and Cooperative Agreement training should be targeted at FMs with 0-3 years of work experience to increase subject matter expertise in this area. Additionally, training for familiarity with the APL Cost Estimating Manual and Management Review of proposals should be provided for this group, as well.

Question 12 asked respondents if their Sector had requested any changes to the G&P documents in the last year; 95% responded in the negative. Question 13 was a free-form text field where respondents could describe any changes sought. These questions attempted to identify any existing policy issues in the grant preparation environment. Three respondents identified requests for minor administrative changes (e.g., to update outdated information). There were no requests for procedural changes. Given the overwhelming number of, “no,” or, “I don’t know” responses, it is clear that staff associated with grant proposal activity and workflows do not believe APL policy inhibits productive activity to the point of motivating a request for a change.

Question 14 asked if the respondent knew of any changes planned at the Sector level for proposal processing. A large majority, 75.5%, of the 98 respondents was unaware of any such changes, and 17.3% responded that there were no changes planned. However, seven respondents, 7.1%, indicated that changes had been requested, of which two were directly related to grant proposals. These responses are shown in Figure 17. Question 15 asked respondents to identify the proposal processing changes. The two proposed changes directly tied to grants processing were:

- Update to Grants and Cooperative Agreements G&P tied to \$700K threshold and “pseudo grants.”
- Remove the majority of the Risk Assessment Tool (RAT) for grant proposals. It makes no sense.

These observations indicate that respondents generally were not aware of any expressed need to change the current proposal process. One proposed change, the \$700K threshold observation, required an administrative update to the G&P that is tied to signature authority within the organization. This proposed update was requested due to changes enacted by Congress to Section

811 of the 2018 National Defense Authorization Act that increased the Truth in Negotiations Act dollar threshold for the submission of certified cost or pricing data from \$750K to \$2M.⁴⁹ APL will apply this threshold for all contract and grant proposals effective July 1, 2018. The second proposed change, to dispense with risk assessments for grants, is associated with policy, and has the potential to relieve some administrative burden for all grant proposals. It is unlikely that APL will support this change because project risk assessments are required for every proposed project to maintain the International Organization for Standardization's quality assurance standard for institutional certification.

These responses indicated that APL sectors are not seeking grant proposal process changes at this time, including those sectors responsible for high-volume grant proposal activity. This was true despite the acceleration of grant proposal work recorded in 2016 and later (See Figure 23). Sectors did not perceive significant process inefficiencies nor did they detect capacity or execution bottlenecks.

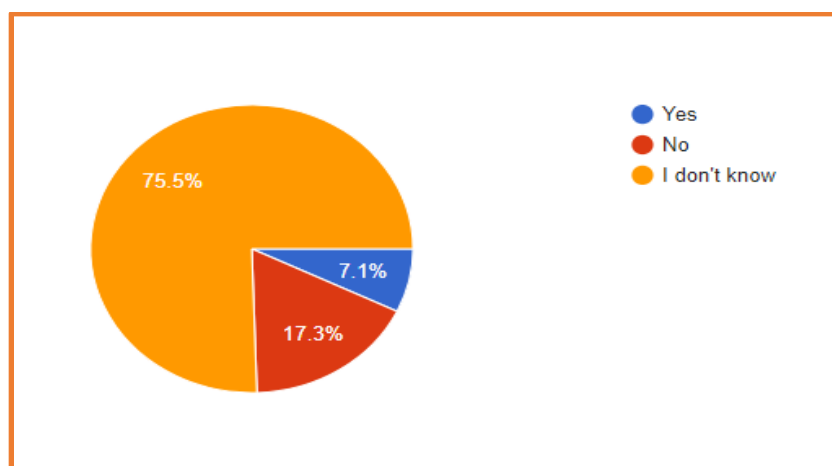


Figure 17. Knowledge of Planned Changes in G&P Documents

⁴⁹ National Defense Authorization Act for Fiscal Year 2018, H.R. Res. 2810, 115th Cong. § 811 (2018) (enacted). Accessed April 21, 2018. <https://www.congress.gov/bill/115th-congress/house-bill/2810/text>.

6.1.3. Analysis of Grant Proposal Data

Questions 16 asked if the grant standards set out in the G&P documents were reasonable. Figure 18 shows that a wide majority, 65%, of the 97 respondents stated that they did not know, but of those who expressed an opinion, 30.9% of respondents, stated that the standards were reasonable. This is an important finding because it showed, again, that Sectors were not seeking changes to grant proposal guidance or policy standards. However, their responses may be derived from their lack of familiarity with the standards, as is shown in Figure 16.

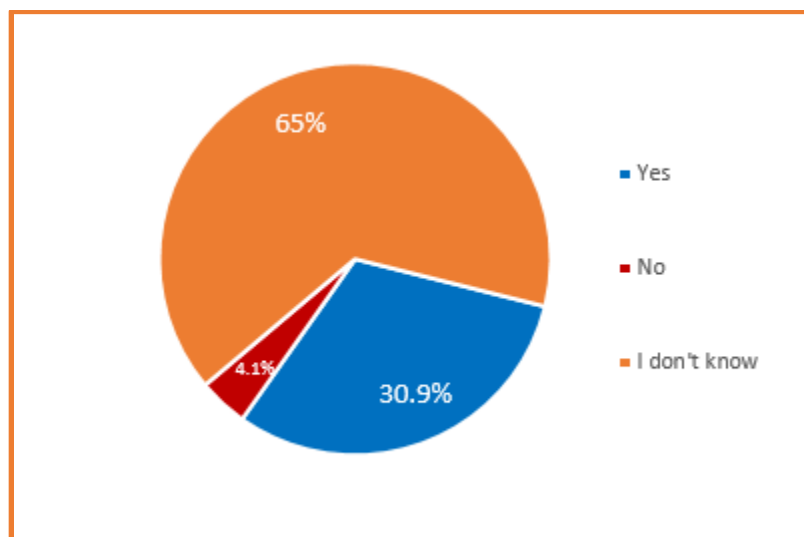


Figure 18. Reasonableness of G&P Documents

Question 17 offered a free-form text box for respondents to explain whether any Sector-specific issues gave rise to significant deviations from standard processes. The most popular response was to eliminate the requirement to complete a risk assessment for every grant project proposed. This was supported by the respondents' belief that grants are low risk and that completing the RAT is "significant over-kill" for R&D research proposals. Another reported that SES has a "more varied sponsor pool" that requires "more unique proposals." The idea is that

“front-office approval is not needed for NIH” grants and that these grant proposals could be approved at the MAE level, saving time in the approval routing loop.

Question 18 asked respondents if their Sector was dependent on another APL internal organization for critical steps in the proposal preparation process, and, if so, to identify which steps were involved. Figure 19 shows that a total of 65 responses were, “I don’t know” or “None.” As this question allowed the selection of more than one answer, the best case is that 31% of the responding population did not recognize Sector or enterprise cross-dependencies in grant proposal development. The worst case, the sum of “I don’t know” and “None” responses, is that 67% of the responding population did not recognize Sector or enterprise cross-dependencies in grant proposal development. These results are significant because they show that there is a lack of understanding of end-to-end proposal processing by a notable number of respondents. In turn, this indicates that they may be unaware of dependencies and resource limitations that could present bottlenecks in the grant proposal preparation process. Some respondents noted that there are multiple dependencies on other APL internal organizations for activities, such as proposal review and proposal submission, proposal preparation, and bid/no-bid decisions. These respondents recognized that these activities are dependent on cross-Sector or enterprise collaboration.

For those respondents who did identify interdependencies, the responses recognized the contributions of research administrators to proposal preparation and submission activities, and that these activities are required to produce a proposal application for external funding.

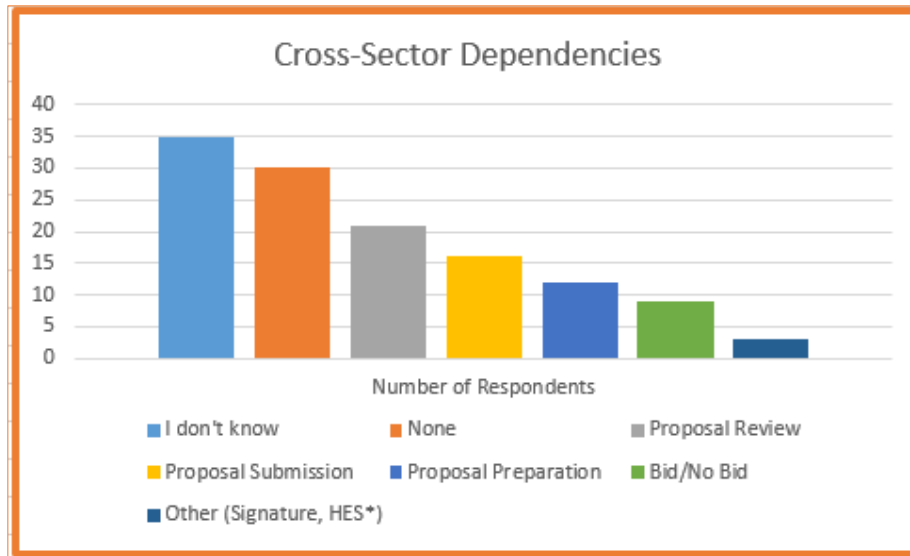


Figure 19. Awareness of Cross-Sector Dependencies in the Grant Proposal Preparation Process (HES is the Health, Environmental, and Safety Group at APL, which evaluates human subject research, animal research, and bio-hazard risk for APL projects.)

Question 19 asked respondents to indicate whether or not their Sector provided sufficient review of grant proposals to ensure compliance with internal G&Ps and solicitation requirements. Most of the 95 respondents, 64.2%, had confidence that sufficient review was taking place; however, 30.5% did not know, and 5.3% responded negatively.

A majority of respondents believed that Sector review of proposals ensured that proposals were compliant. This belief is contradicted, however, by responses to questions 9, 10, and 11. The earlier responses indicated respondents were not aware of the standards to which proposals must adhere. The response pattern to these questions demonstrated that many respondents did not have a clear view of the activities, resourcing, and workflow required to make grant proposals complete, compliant, and compelling.

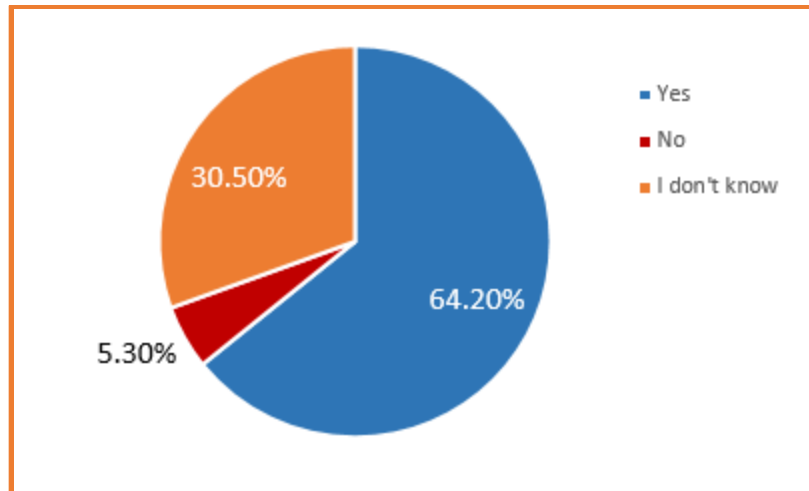


Figure 20. Indication of Sufficient Sector Support for Review Proposals

Question 20 asked respondents if they expected significant growth in grant proposal bid volume in the next two years.

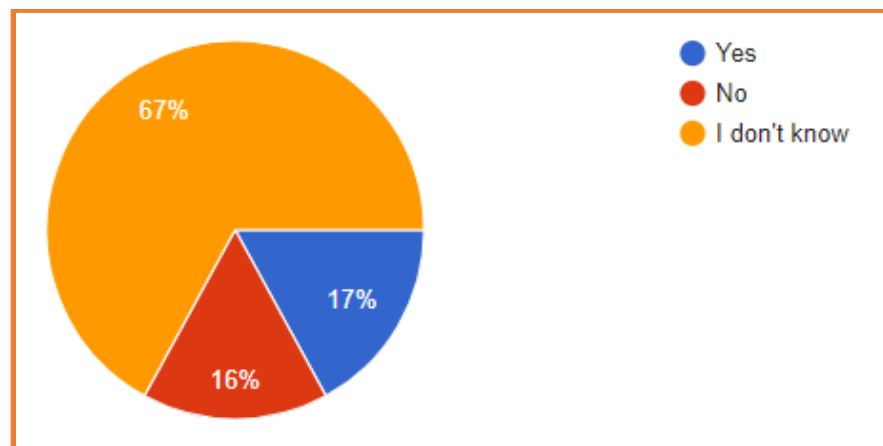


Figure 21. Indication of Growth in Grant Proposal Bid Volume

Approximately 83% of respondents, as shown in Figure 21, either did not know whether growth was expected or did not believe it was coming. However, 17% of respondents indicated that significant growth was expected. Responses to the questionnaire did not align with business data

available to BCSD at APL.⁵⁰ An analysis of grant awards and grant proposals volume indicated that there is sustained growth in both of those workflows.

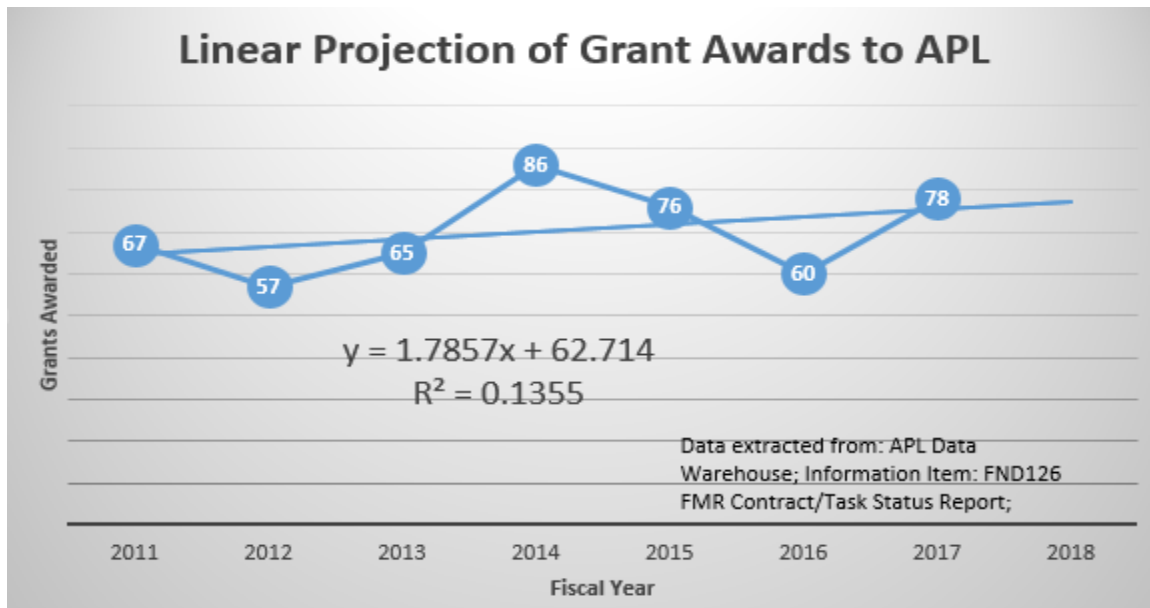


Figure 22. Projection of Grant Awards to APL⁴¹

Figure 22 is a linear projection of grants awarded to APL. The graph indicates grant award volume is growing over time but that the number of awards may vary in any given year. One aspect of this variability is that the projection for FY2018 may tend to be inaccurate. A mathematical way of measuring this uncertainty is to apply the R-squared test. R-squared, also known as the coefficient of determination, is a measure of the fit of data to a regression line on a chart. In this chart, the R-squared value is relatively low at 13%. A perfect fit would score 100%.

Grant award growth is only one measure of the system. Early indicators of future growth measures grant proposal activity. Figure 23 demonstrates that grant proposal activity has increased significantly at APL.

⁵⁰ Michael Dolan, "Contract, Grant & IPA Status Report," last modified February 19, 2018, PDF.

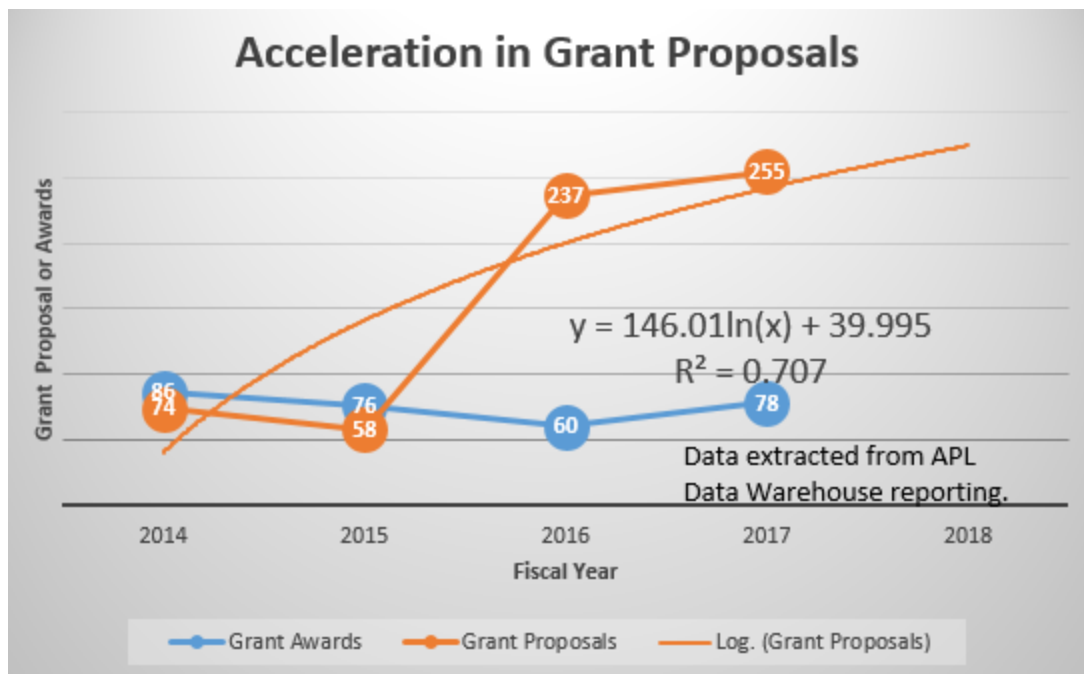


Figure 23. Acceleration in Grant Proposals⁵¹

Figure 23 shows a logarithmic regression model of the APL grant proposals data for the period 2014 to 2017. The Figure shows that grant proposal volume grew significantly in 2016, and there was some additional growth in 2017. As a result, the best fit function is a non-linear model. The model function plot includes a one-year projection. The fit of the logarithmic regression model to the data was tested mathematically. The R-squared value is reasonably high (70.7%), suggesting that the logarithmic approach fits the data well. The projection indicates that grant proposal activity will continue to climb in 2018, but not at the dramatic rate seen in 2016. Of interest, both measures of grant activity (proposals and awards) are growing, which adds pressure inside APL's grant-processing workflows.

⁵¹ Michael Dolan, "Contract, Grant & IPA Status Report," last modified February 19, 2018, PDF.

Question 21 asked respondents if their Sector currently had sufficient internal capacity to handle grant bids. As shown in Figure 24, 38.3% of the respondents answered, “Yes.” 45.7% of respondents said they did not know, and 16% answered, “No.”

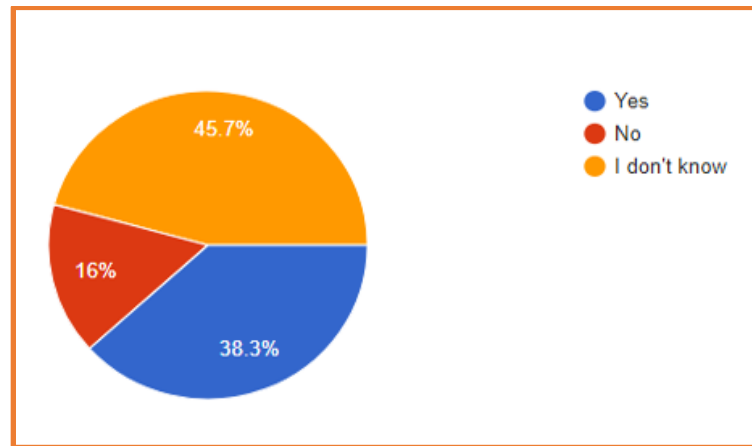


Figure 24. Sector Capacity to Handle Grant Proposals

An analysis of the SES and REDD sub-groups of the response data for this question disclosed that between 33% and 37% of respondents from those Sectors and who held either a “Yes” or a “No” opinion identified capacity shortfalls in grant proposal production. In SES, nine PIs and one researcher, all with ten or more years of experience held that there was insufficient capacity. The data also showed that 17 SES peer respondents, primarily PIs, and including one of the FMs who processed at least 16 grant proposals per year, held there was sufficient capacity. A similar analysis was performed for the REDD Sector. Of six respondents indicating either “Yes” or “No,” one PM and one FM stated there was insufficient capacity. When considering all respondents with a “Yes” or “No” opinion, 29.4% state there is insufficient capacity. This data indicated there was some pressure noted in the APL grant proposal processing capacity. In SES, the capacity insufficiency was noted by researchers, but in REDD it was noted by both an FM

and a PM. There were too few responses from the other Sectors to identify accurately where pressure points were.

6.1.4. Analysis of Contract-Proposal Specific Data

Although this data was collected in questions 23–29, these results were discarded, as the focus of this paper was specifically on the grant proposal processes. However, this data may be used by APL in the future to study the contract proposal process.

6.1.5. Analysis of Free-Form Suggestions or Other Observations

There were 46 responses to the two free-form text questions, Questions 22 and 30. Responses were classified and ordered into categories: hierarchy (2), education (7), general suggestions (10), and workflow changes (20). The high number of suggestions about workflow reflects that survey Question 22 specifically asked for recommendations for workflow improvements.

Respondents expressed concerns that the workflows for grant proposal preparation and routing processes require excessive oversight and are more bureaucratic and complicated than what, they believed, was warranted for grants. Suggestions were made to streamline and optimize these workflows by making more B&P funding available for grant proposal development, engaging GMs and FMs earlier in the proposal development process, and having a more transparent view into proposal budget preparation and proposal routing status. Parallel, rather than serial, proposal routing, and the elimination of Group Supervisors and Program Managers in the review process were suggested. Question 30 provided respondents the opportunity to offer any comment, suggestion, or observation. A subset of the data, 25 responses, was not actionable in this analysis process. These responses were composed of comments such

as, “NA, none, I don’t know, Not sure,” etc. Both groups of data were addressed simultaneously during the analytic stage.

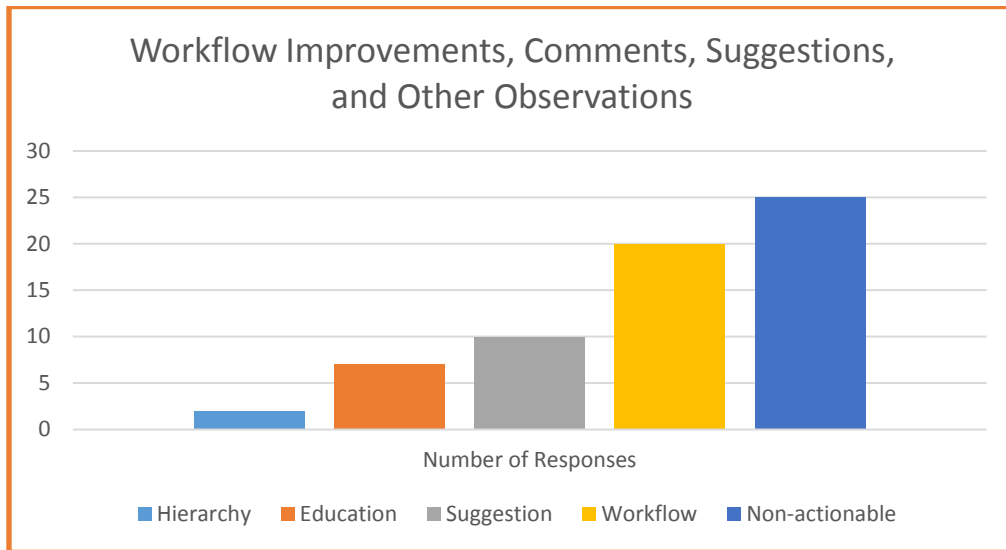


Figure 25. Number of Comments, Suggestions, and Other Observations

Chapter 7. Recommendations and Conclusions

7.1. Introduction

The data gathering and analysis activities that underpin this paper shows there is room for improvement in grant proposal processes. The volume of grant applications and ensuing awards is challenging the existing grant processes. Analysis of institutional structure, workflows, and the positioning of compliance controls indicates an opportunity to improve institutional effectiveness and efficiency. The data, analysis, and recommendations below address all of the research questions posed and Section 1.3.

Organizational change and continuous improvements to processes must keep up with growth and demand, especially in the area of proposal workflow. The growth in activities, in the development, submission and managing of grant proposals and changes in the APL technology platforms, are drivers of change. Any transformational change intended to make a lasting impact requires the endorsement and support of management at the highest level. Additionally, any changes to existing processes must be carefully managed and accepted cross-organizationally. For these reasons, the recommendations in this paper were submitted as contributions to the BCSD 202X Strategic Planning Initiative PM, and they are aligned with some of the plan's key objectives, as identified in the following subheadings.

7.2. BCSD 202X—Work Practices

7.2.1. Recommendation One: Re-position compliance review activities in time and recast as mobile, on-demand shared service that engages as soon as proposal preparation is authorized to start.

This is a fundamental recommendation based on the idea of transforming the grant proposal compliance activities from detective controls (which look for possible defects or errors near the end of the cycle) into preventative controls (which keep errors from happening). Section 1.2, Statement of the Problem, discusses time pressures that result in late engagement of compliance control review. The analysis provided in Section 6.1.2 makes it clear that grant proposal process respondents have a weak understanding of policy. Section 6.1.3 goes on to suggest that grant proposal process respondents do not have a full understanding of the end-to-end, cross-organizational process. Implementation of this recommendation would lower the risk of proposal non-compliance and re-work.

Routing proposals for quality assurance and compliance can present a barrier to the timely submission of a proposal. The structure of the current review workflow forces the compliance check to be a detective control. This can be problematic when looming proposal deadlines force a proposal to be rushed through the technical and financial review cycles, or an application cannot be completed on time. Both of these outcomes result in cost risks to the institution. If compliance checks were made earlier, repositioning these as a preventative control, these risks could be mitigated.

Compliance controls can easily be repositioned as shown in Figure 25. The critical step is to engage all proposal team members immediately when a bid decision has been made. This decision can be communicated to proposal team members, including compliance, via a system-generated email when either a request for bids and proposal funding has been approved, or a pre-award risk assessment template is created in the RAT. That positioning promises a reduction of rework, removes a layer of sequential activity, and leverages existing or emerging IT systems, such as the ERP and WebEx, to communicate review observations and enhance organizational

flexibility and performance. A description of this transformed engagement system is provided in the model below.

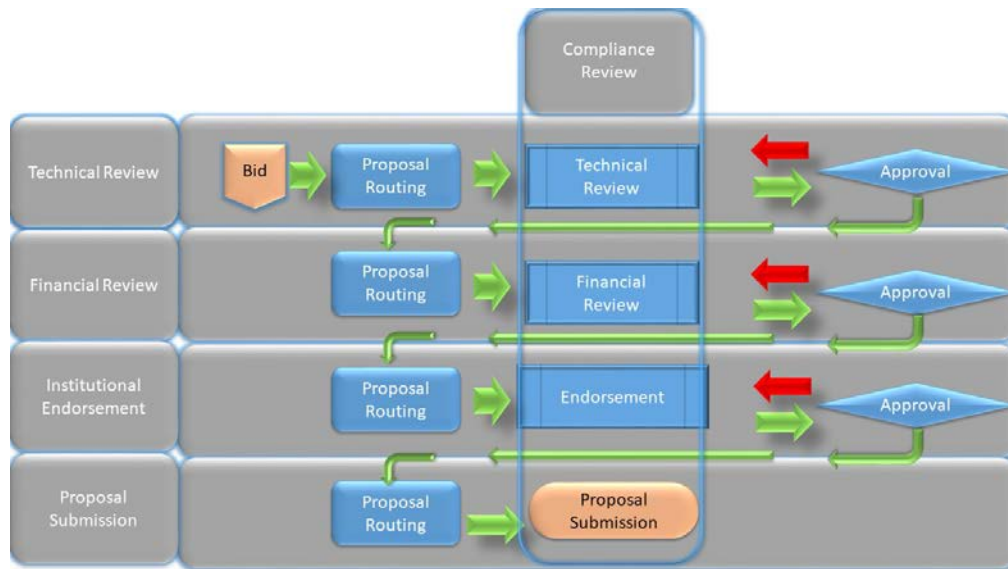


Figure 26. Recommended Repositioning of Compliance Review in the Workflow Structure

Questions 9, 10, and 11 of the survey measured respondents' familiarity with internal APL G&P documents, which serve as a compliance control for Management Review of Proposals, Proposal Cost Estimating, and Grant & Cooperative Agreement determination. Since a large percentage of respondents were not familiar with these documents, process expertise gaps may be one reason why proposals might not as consistently complete, compliant, and compelling as they should be.

Repositioning compliance controls to the beginning of the proposal development process could mitigate the risk that proposals are prepared without considering the G&Ps. This change would also create the opportunity to discuss measures called for in state and federal regulations as well as other elements specific to the individual solicitation.

Respondents indicated that they believed that grants are in a low-risk category and do not require the same level of oversight as contracts. Several recommended the abolition of the risk assessment step in the grant proposal process. Although it is unlikely that this step will be removed, research administration personnel would be available to assist researchers with this task.

Chapter 2 discusses the evolution of organizational design. As organizations become more complex, they have to remove functional silos and adopt a flatter, more matrixed structure. As for grant proposal development processes at APL, the implementation of mobile shared service applies available resources and expertise even more efficiently against a dynamic grant proposal preparation workflow.

7.3. BCSD 202X—Work Place and Partnership

Grant proposal volume data, shown in Figure 7, made it clear that the level and types of engagement required would vary by Sector. Proposal preparation teams would be enhanced by creating mobile teams of subject matter experts, with flexible work dynamics that make customer collaborations and interactions a priority.

7.3.1. Recommendation Two: Deploy mobile grant shared services capability.

It is likely that SES, with its high volume of grants, as shown in Figure 7, would benefit from mobile grant shared services that could provide surge capacity to manage high-volume periods of proposal activity. This would address the emerging grant proposal production capacity issues identified in the analysis of survey Question 21. SES would also profit from the repositioned grant proposal workflow because compliance issues would be addressed at onset and avoid submission schedule pressure caused by rework. If recommendation one were

implemented, that, combined with this recommendation, would relieve pressure within the highest grant proposal producing Sector at APL.

Other Sectors at APL would benefit from the same dynamic work structure but for a different reason. As discussed in Question 18, these Sectors have low expertise with end-to-end grant proposal processes due to the low volumes of grant proposals they prepare. These Sectors require on-demand, expert grant proposal preparation services from other parts of APL.

Further analysis should be conducted to determine how many employees would be required to establish this dynamic workplace activity.

A mobile shared service structure would also address a secondary issue evident in this research data. Grant proposal process expertise is not diffused across APL. A dynamic work structure offers the opportunity to broaden expertise and create partnerships across the enterprise.

Responses to question 18 indicated that there were cross-enterprise dependencies in the grant proposal process, which are not widely recognized. The goal is to identify these dependencies and create partnerships that contribute to more efficient and streamlined proposal preparation processes. BCSD has taken the initiative to embed support by deploying its staff to work on-site in some Sectors. Based on personal experience, the author can say that face-to-face interaction with researchers, FMs, and PMAs has shifted compliance engagement forward in time in the proposal development sequence. Tufts University uses a similar engagement strategy, positioning “clusters” of trained research administrators to support Sector pre-award proposal development.⁵²

⁵²Zoya Davis-Hamilton and Sarah Marina, "Changes in Organizational Design as a Vehicle for Improving Support to Investigators," NCURA Magazine (December 2017): 11.

The combination of new IT and flexible work dynamics as described in Section 2.6 and 2.7, and operating from a principle of partnership catalyze the concept of a mobile grants proposal team, which would a) provide surge capability, b) provide and diffuse expertise, c) restructure proposal workflow, and d) leverage IT to maximize availability.

7.3.2. Recommendation Three: Provide G&P training sessions.

Responses to Questions 9, 10, 11 showed that familiarity with APL G&Ps related to proposal processing was lacking. One of the services provided by mobile shared services clusters could be to conduct short duration training sessions to sector employees involved in grant proposal preparation, especially those outside of the SES and REDD Sectors. These sessions could be given during regularly scheduled group meetings, or as “brown bag” sessions during the lunch period. The training period would last no longer than 40 minutes, allowing time for a question and answer session, with a total training period of less than one hour.

7.4. BCSD 202X—Establish a Big-Picture Vision

BCSD’s vision is to become a “value added, sought-after partner providing impactful results that leverage novel organizational and technology solutions.”⁵³

7.4.1. Recommendation Four: Further leverage mobile shared services and mobile IT with new ERP modules for grant workflows.

The BCSD 202X activity should develop a system requirement for the new ERP platform that enables an improved grant proposal routing process. The opportunity to shift toward the shared services center model is rapidly approaching, as is evident in the literature review in Sections 2.3 – 2.5. APL has created infrastructure as part of their Business Continuity Plan,

⁵³ Rude, "BCSD 202X."

which allows for mobile IT communications via mobile phones, tablets, and laptop computers that enable a work-from-anywhere capability with secure connectivity via virtual private networks (VPNs). Recent voice over IP (VoIP) initiatives eliminates the need for a telephone handset, with the laptop replacing it. WebEx provides video capability to facilitate meetings with fellow APL employees across campus, around the country, and globally. These steps propel alignment and offer the opportunity for improved performance as discussed in Section 2.6.

More steps are underway. APL is currently updating the ERP system to modernize its planning and cost estimating modules. The transition to the new IT infrastructure offers the opportunity for the organization to reorganize workflows. The deployment of new ERP modules represents the chance to eliminate restrictive, homegrown systems, such as the ERT. Having all proposal documents in one place will obviate the need to recreate or download documents from one system to the ERT and back, saving time. The new ERP would also allow reviewers to see when changes were made to a document, ensuring that everyone is working on the most current document version.

7.4.2. Recommendation Five: Improve strategic flexibility by extending ERP capability into S2S transfers.

The BCSD 202X activity should develop a system requirement for the new ERP platform that enables an improved grant proposal submission process. This activity would increase ERP functionality by integrating S2S submission capability for electronic proposal submission systems, such as Grants.gov. Currently, the FMs must print out or download electronic proposals to edit or review and upload changed proposals into ERT for further routing. Creating the proposal in an ERP system with S2S capability would eliminate the need for proposal developers to create a proposal in one system and route or edit it in another. This would result in labor

savings that could be applied to the growing workload projected in Figure 23. Providing the mobile services teams S2S capability allows those teams to engage with customers on-site for cradle-to-grave-grant proposal preparation operations in a modern, flexible environment that adheres to the principles of strategic flexibility described in section 2.2.

Conclusion

Advances in communications technology and its use at APL have made it easier to conduct pre-proposal kickoff meetings from anywhere. This, in turn, allows the modernization of information flows, repositioning of the compliance workflow, and refactoring of engagement by research administrators. Driven by recommendations resulting from this research effort, the opportunity exists to make sure proposal teams are on the same page at onset, that tasks are assigned concurrently, and that internal deliverable sequencing is set. Establishing a shared view of compliance risks is more likely when the compliance workflow is positioned earlier in the proposal development process. These changes, as well as others associated with building strategic flexibility, offer the potential for cross-APL improvements to grant proposal preparation.

Finally, given the strategic modernization in BCSD, these observations, data, and recommendations can be handed off to a team of change agents for evaluation and action. Implementation of these recommendations will achieve an overall improvement for the grant proposal processing for all stakeholders, within a risk framework that is accepted by the institution, researchers, and research administration staff.

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Appendix 1 – Survey Questionnaire

Grant & Contract Proposal Process Questionnaire

I would like to request your participation in a brief survey. Your honest and complete responses to this survey will provide valuable insight into the current grant and contract proposal preparation processes and possibly identify ways to improve these processes at APL.

This brief survey should take no more than 15 minutes of your time.

I am conducting this survey to inform contributions to BCSD's 202X Strategic Planning Initiatives which is part of APL's Centennial Vision. Additionally, I am gathering this information to perform a needs assessment for a research paper I am writing, as part of my Capstone Project for a Master's of Science Degree in Research Administration at Johns Hopkins University.

By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary and you can stop at any time. Responses to this questionnaire are anonymous and will not be linked back to the participant or used in any way that could impact participant's employment.

* Required

RESPONDENT CHARACTERIZATION QUESTIONS

1. 1. What is your current position at APL? *

Mark only one oval.

- ☐ Program Manager
- ☐ Principal Investigator
- ☐ Financial Manager
- ☐ Program Management Assistant
- ☐ Contract/Grant Manager
- ☐ Sub-Contract Manager
- ☐ I do not wish to answer
- ☐ Other: _____

2. 2. How long have you worked in your current position? *

Mark only one oval.

- ☐ 0-3 years
- ☐ 4-6 years
- ☐ 7-9 years
- ☐ 10+ years
- ☐ I do not wish to answer

3. 3. How many years have you been employed at APL? *

Mark only one oval.

- ☐ 0-3 years
- ☐ 4-6 years
- ☐ 7-9 years
- ☐ 10 + years
- ☐ Do not wish to answer

4. 4. In which APL Sector are you currently employed? *

Mark only one oval.

- ☐ AOS
- ☐ AMDS
- ☐ FPS
- ☐ NSAD
- ☐ REDD
- ☐ SES
- ☐ Other
- ☐ Do not wish to answer

5. 5. In which Sector(s) have you worked at APL? Choose all that apply. *

Check all that apply.

- ☐ AOS
- ☐ AMDS
- ☐ FPS
- ☐ NSAD
- ☐ REDD
- ☐ SES
- ☐ Do not wish to answer
- ☐ Other: _____

6. 6. Do you prepare proposals? If you answer neither, you are done with the questionnaire. *

Mark only one oval.

- ☐ Primarily Contract proposals
- ☐ Primarily Grant proposals
- ☐ Both
- ☐ Neither

7. 7. Grant Proposals: Approximately how many grant proposals did you prepare in the last year?

Mark only one oval.

- ☐ 0
- ☐ 1-5
- ☐ 6-10
- ☐ 10-15
- ☐ 16 or more

8. 8. Contract Proposals: Approximately how many contract proposals did you prepare in the last year?

Mark only one oval.

- ☐ 0
- ☐ 1-5
- ☐ 6-10
- ☐ 10-15
- ☐ 16 or more

EXISTING PROCESS QUESTIONS

9. 9. On a scale of 1-4 how familiar are you familiar with the Guidance & Procedure Document 001-0037 - Management Review of Proposals?

Mark only one oval.

	1	2	3	4	
Not very familiar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Expert

10. 10. On a scale of 1-4 how familiar are you with Guidance & Procedure Document 13-0009 - APL Cost Estimating Manual?

Mark only one oval.

	1	2	3	4	
Not very familiar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Expert

11. 11. On a scale of 1-4 how familiar are you with Guidance & Procedure Document 13-0007 Grants & Cooperative Agreements?

Mark only one oval.

	1	2	3	4	
Not very familiar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Expert

-
12. **12. Has your sector requested changes to any of these Guidance & Procedure Documents in the past year?**

Check all that apply.

- ☐ Yes, to the grant standards
☐ Yes, to the contract standards
☐ Yes, to both standards
☐ None
☐ I don't know

13. **13. If your sector requested changes, per the question above, what were those proposed changes?**

14. **14. Has your sector planned changes to any of its proposal formulation processes this year?**

Mark only one oval.

- ☐ Yes
☐ No
☐ I don't know

15. **15. If your sector planned any changes, per the question above, what were those changes?**

GRANT PROPOSAL QUESTIONS

16. **16. Are the grant standards set out in the Guidance & Procedure Documents reasonable?**

Mark only one oval.

- ☐ Yes
☐ No
☐ I don't know

-
17. **17. Grant Preparation: Are there Sector specific issues that give rise to significant deviations from standard processes? If so, what are they?**

18. **18. Grant Preparation: Is your Sector dependent on another APL internal organization for critical proposal preparation steps? If so, which steps are involved?**

Check all that apply.

- ☐ Bid/No Bid
- ☐ Proposal preparation
- ☐ Proposal Review
- ☐ Proposal Submission
- ☐ None
- ☐ I don't know
- ☐ Other: _____

19. **19. Does your Sector provide sufficient review to ensure that grant proposals are compliant with internal Guidance & Procedures and responsive to sponsor solicitations?**

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ I don't know

20. **20. Does your sector expect significant growth in grant proposal bid volume in the next two years?**

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ I don't know

21. **21. Does your sector have sufficient internal capacity to handle grant bids today?**

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ I don't know

-
22. 22. In your opinion, what changes should be made to existing grant proposal preparation workflows?

CONTRACT PROPOSAL QUESTIONS

23. 23. Are the contract standards set out in the G&Ps reasonable?

Mark only one oval.

- ☐ Yes
☐ No
☐ I don't know

24. 24. Contract Preparation: Are there sector specific issues that give rise to significant deviations from standard processes? If so, what are they?

25. 25. Contract Preparation: Is your sector dependent on another APL internal organization for critical proposal preparation steps? If so, which steps are involved?

Check all that apply.

- ☐ Bid/No Bid
☐ Proposal preparation
☐ Proposal Review
☐ Proposal Submission
☐ None
☐ I don't know
☐ Other: _____

26. 26. Does your Sector provide sufficient review to ensure that contract proposals are compliant with internal Guidance & Procedures and responsive to sponsor solicitations?

Mark only one oval.

- ☐ Yes
☐ No
☐ I don't know

27. **27. Does your sector expect significant growth in contract proposal bid volume in the next two years?**

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ I don't know

28. **28. Does your sector have sufficient internal capacity to handle contract bids today?**

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ I don't know

29. **29. In your opinion, what changes should be made to existing contract proposal preparation workflows?**

SUGGESTIONS OR OTHER OBSERVATIONS

30. **30. Please provide any additional comments:**

Appendix 2 – Homewood Institutional Review Board Approval



Homewood Institutional Review Board

3400 N. Charles Street
Wyman Park Building, Suite N468
Baltimore MD 21218-2685
410-516-6580
<http://homewoodirb.jhu.edu/>

Michael McCloskey, PhD
IRB Chair

Date: March 12, 2018

PI Name: Marianne Woods

Study #: HIRB00007040

Study Name: Research into Centralized Proposal Processing for an MDA Contract and Certain Grant Proposals from Sectors Other than Space and REDD

Date of Review: 3/12/2018

Date of Approval: 3/12/2018

Expiration Date: 3/12/2021

The above referenced study has been *approved*.

Review Type:	Exempt
Funding Agency:	Not funded
Grant or Contract Number:	
International Sites:	No
Maximum number of participants:	200
Vulnerable populations:	Johns Hopkins Employees
Consent process:	Survey/questionnaire consent
Assent Process:	

Please keep in mind that it is your responsibility to inform the HIRB of any adverse

consequences to participants that occur in the course of the study, as well as any complaints from participants regarding the research. In conducting this research, you are required to follow the requirements listed in the *HIRB Policies and Procedures Manual*.

The recruitment and consent document is approved and stamped. This is accessible via the Stamped Documents tab on the New Application Workspace.

Approved Documents:

Recruiting Materials:
Recruitment e-mail script

Study Team Members:
Melinda Locke

APPROVAL IS GRANTED UNDER THE TERMS OF FWA00005834 FEDERAL-WIDE ASSURANCE OF COMPLIANCE WITH DHHS REGULATIONS FOR PROTECTION OF HUMAN RESEARCH SUBJECTS
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Curriculum Vitae

MELINDA P. LOCKE is a Grants and Intergovernmental Personnel Act (IPA) Agreement Manager in the BSB (Contracts Group) of the APL Business Communications Service Department and a member of the Senior Professional Staff. She received her B.A in German Languages and Literature from the University of Maryland, College Park. Before joining APL, she accompanied her spouse on Foreign Service tours in Malawi, Italy, Switzerland, and Greece. Her e-mail address is mlocke3@jhu.edu.